FEBRUARY, 1926

Railway Engineering and Maintenance

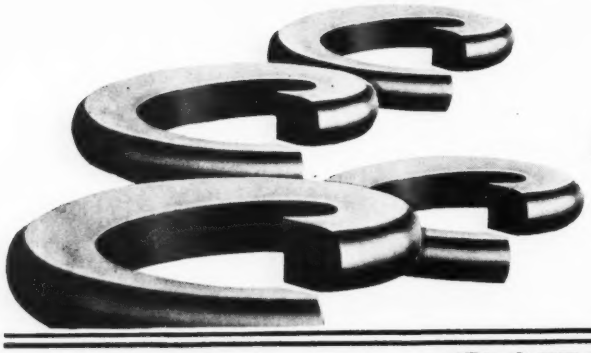
FORGET THE COST Per Thousand Pieces

YOU purchase spring washers for a definite purpose—to keep track bolts tight. It's the pressure that does the work—so why not purchase them on a pressure basis. Forget the cost per thousand—but keep in mind the cost per thousand pounds pressure.

IMPROVED HIPOWER may not cost less per thousand pieces, but based on the pressure which it exerts, the IMPROVED HIPOWER Spring Washer costs initially 90% less per thousand pounds pressure than do Nut Locks.

The National Lock Washer Co.
Newark, N. J., U. S. A.

HIPOWER



For permanent rail joint security

HY-CROME

—by its lasting resiliency —toughness and non-fatiguing properties has set new mileage standard for nut lock buying dollars. There are other nut locks but no economical substitute for Hy-Crome.

THE RELIANCE MFG. CO.
MASSILLON, OHIO
NEW YORK CLEVELAND DETROIT CHICAGO
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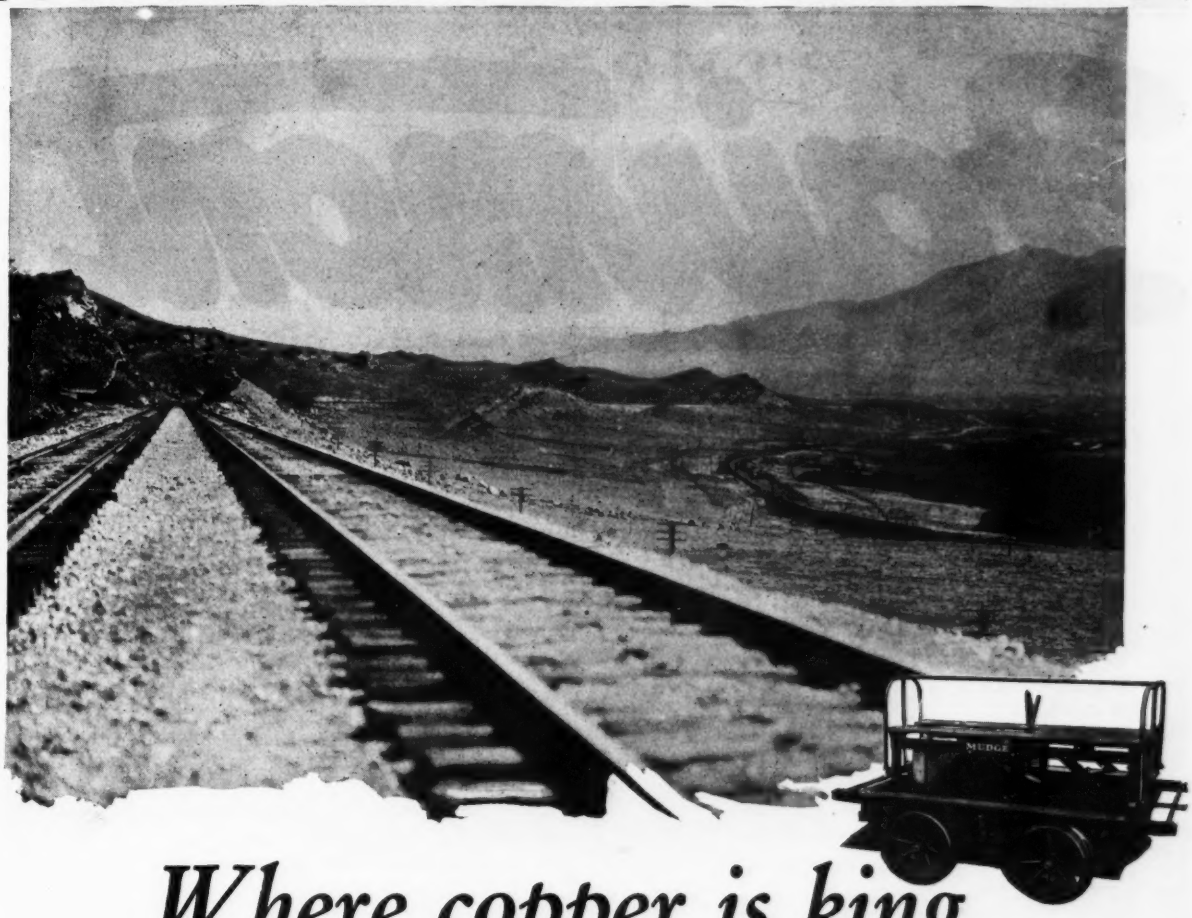
LOWER COST PER CAR PER MILE



Where copper is king

AND out in Montana, where men are men and copper is king—there, too, you'll find Mudge Motor Cars doing a hard job well.

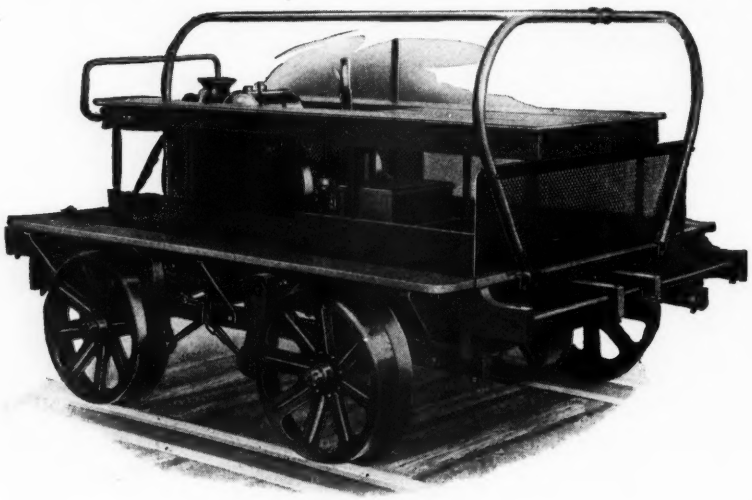
They are built to stand tough weather and hard use. In the sturdy and simple little engine there is power enough to surmount far steeper grades than those that will be encountered. And there's stamina enough to stand up under the steady grind. What's more, the engine will start quickly—winter or summer. Mudge Motor Cars stand the test, for they're built for real performance. That's why you'll find them all over the world.

Mudge & Company

Manufacturers—Railroad Equipment
Railway Exchange Building, Chicago

A MOTOR CAR FOR EVERY SERVICE

Fairmont



More Work per Gallon

Performance on the Job Counts

On hundreds of railroads Fairmont Railway Motor Cars are daily setting new records for fuel economy.

Their water-cooled ball-bearing engine and endless cord belt transmission consistently develop greater pulling power—enabling these sturdy cars to get more work done per gallon of gas and oil.

Ruggedly constructed throughout with wearing parts extra large, Fairmont Cars are as dependable as they are economical.

Dynamometer car tests will prove their greater reliability and safer, lower cost performance on your road. We will supply the dynamometer car and co-operate with you in making such tests, any time you say. Write for further details.

Fairmont Railway Motors, Inc.
Fairmont, Minnesota

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Chicago New York San Francisco
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FAIRMONT RAILWAY MOTOR CARS

M19	Inspection Car for one to four men.
M14	Light Section Car for gangs up to six men.
*A2 *M2 *S2	Section Cars. Seating capacities from eight to twelve men. Pulling capacities up to fifty men.

*AT2–MT2–ST2 are corresponding models equipped with 2 speed transmission for extra heavy pulling.

FOR THE TWELFTH CONSECUTIVE YEAR OVER HALF THE CARS PURCHASED ARE FAIRMONTS

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Railway Engineering and Maintenance

Formerly the Railway Maintenance Engineer

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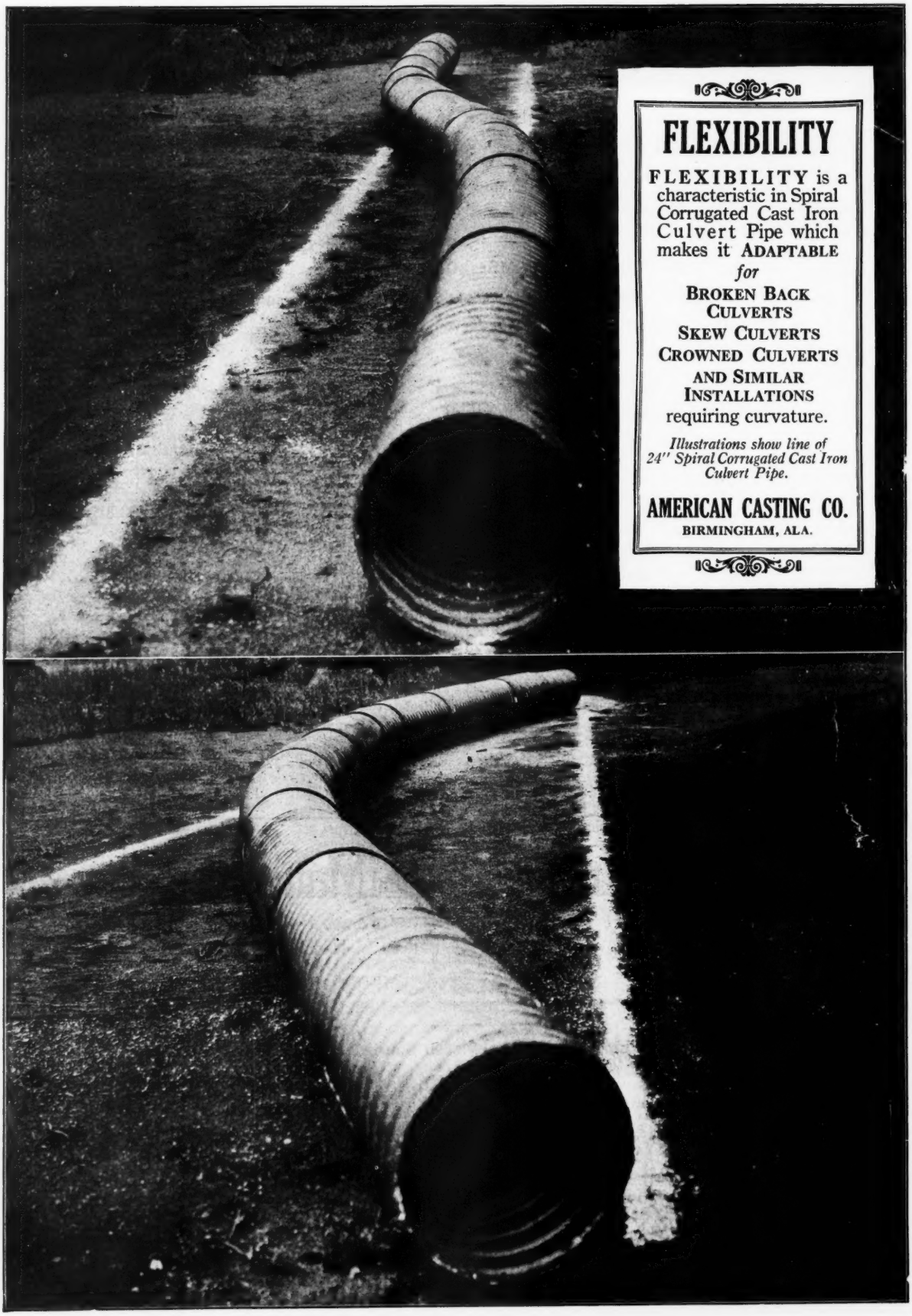

FLEXIBILITY

FLEXIBILITY is a characteristic in Spiral Corrugated Cast Iron Culvert Pipe which makes it **ADAPTABLE** *for*

BROKEN BACK CULVERTS
SKEW CULVERTS
CROWNED CULVERTS
AND SIMILAR INSTALLATIONS
requiring curvature.

Illustrations show line of 24" Spiral Corrugated Cast Iron Culvert Pipe.

AMERICAN CASTING CO.
BIRMINGHAM, ALA.

Q & C MANGANESE ONE PIECE GUARD RAILS ARE EFFICIENT AND ECONOMICAL

Because—Being made in one piece they eliminate all guard rail fittings and greatly reduce the time in installing on your main line. The Manganese steel, noted for resisting abrasion, makes maintenance practically unnecessary. Designed and built to last as long as the frog point.

The Q & C Company

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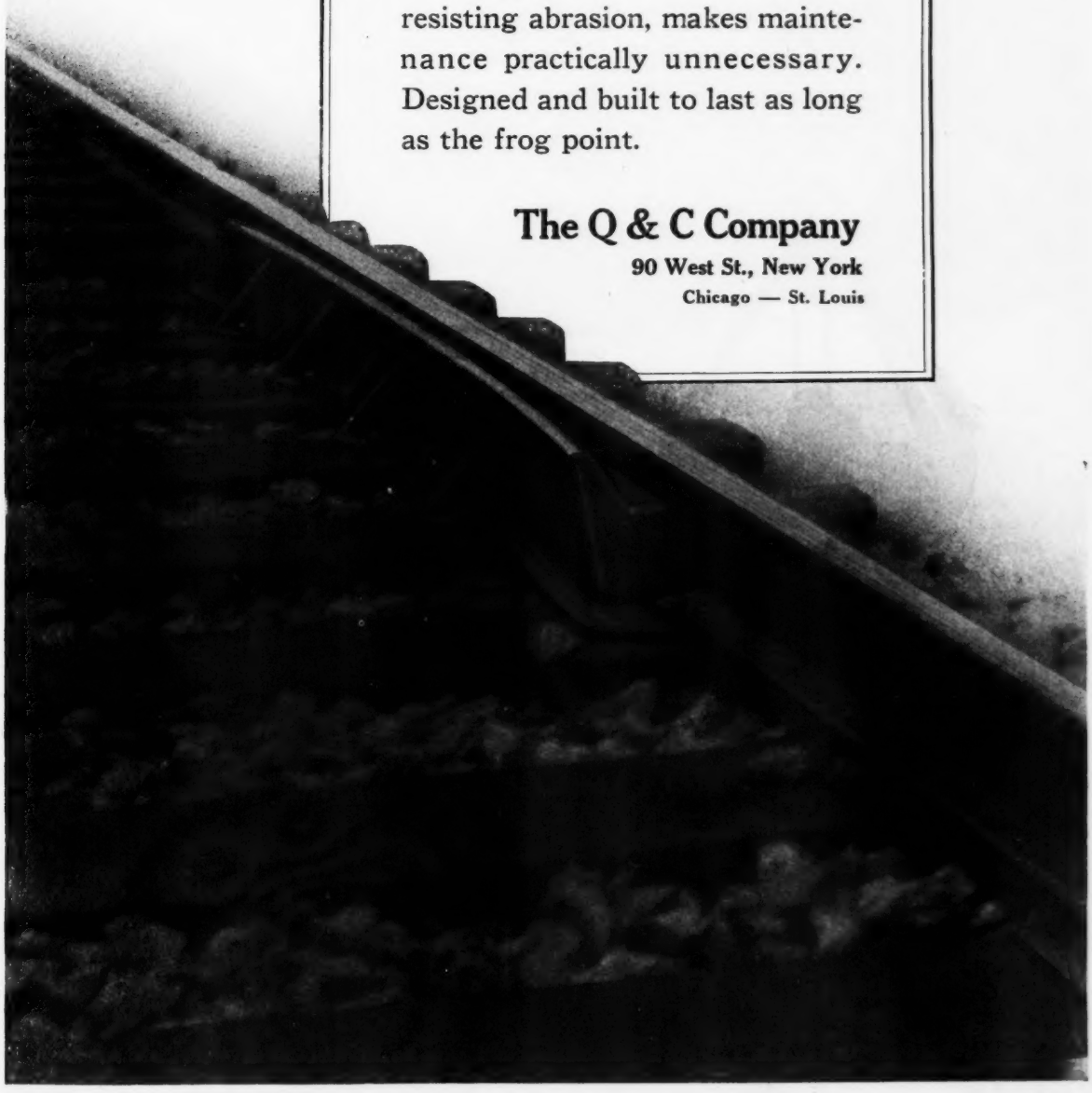
Chicago — St. Louis



A Mouthful at Every Bite

Guarantee
Owen Buckets, properly installed and operated, are guaranteed to do a bigger day's work than any other bucket of the same weight and capacity—
—or—
Write your own guarantee!
OWEN BUCKET CO.

THERE is strength in the jaws of Owen Buckets. They are built that way, for we know a bucket must perform hard work efficiently day after day, despite the rough usage which buckets cannot escape.

Maybe you should be watchful with some buckets, but you can be careless with Owens. Give them the toughest digging jobs in all of your work . . . use them where durability must be proven by actual accomplishment—where quickness counts in excavating and in moving materials . . . give them a job where heaping loads have been rare. That's the best way of all to test Owens. You'll see something, then.

Because there's strength in the jaws of an Owen Bucket—it is built that way—and like the ancient triceratops of tremendous power, it gets A Mouthful At Every Bite, every time, in any material, until the job is finished.

Besides STRENGTH there are nine points of superiority in Owens—nine reasons why you should use them. A post card will bring you all the details and no obligation whatever.

The OWEN BUCKET Co.

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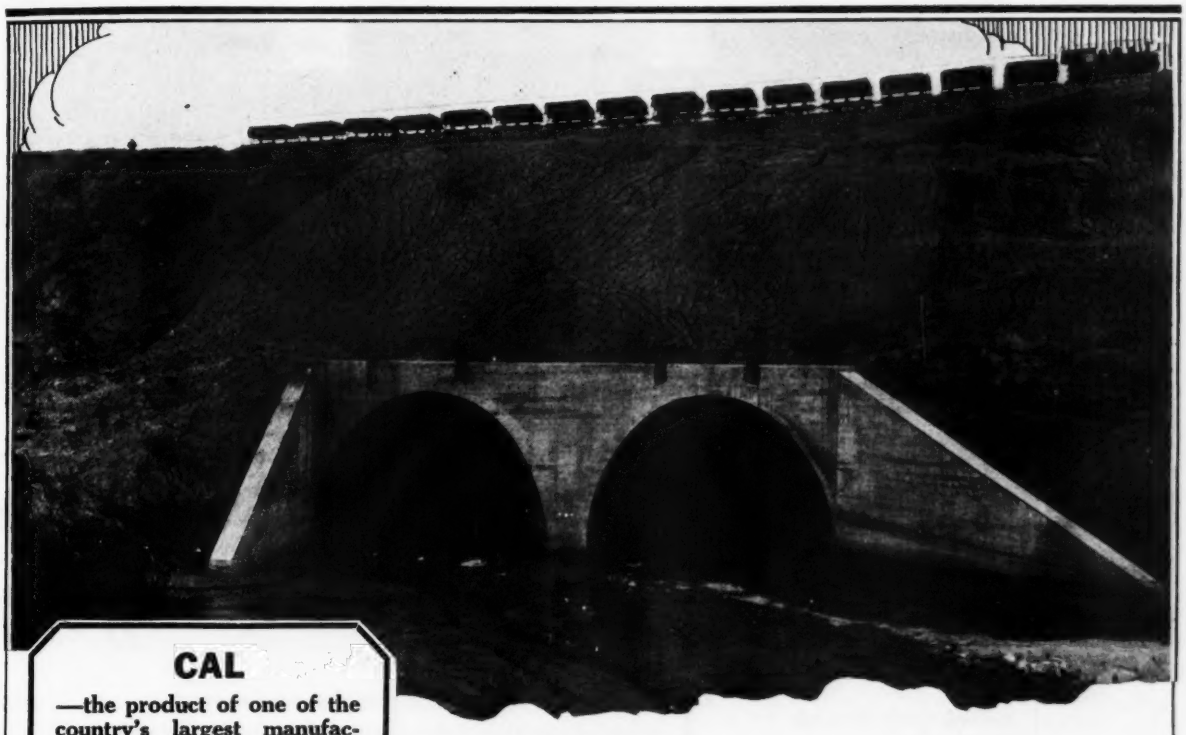
Baltimore Chicago Dallas Los Angeles Minneapolis Philadelphia
Pittsburgh New York Miami Portland St. Louis San Francisco

INSURE A BIGGER DAY'S WORK

C O. B. CO.

Where resumption of traffic demands a quick "fill," let CAL cut the time 50%



CAL

—the product of one of the country's largest manufacturers of Portland cement is assurance of its worth and a guarantee of its safety.

With a background of ten years of scientific investigation and five years of practical use in every conceivable type of concrete construction, Cal enters the railway engineering field with the confidence which its record warrants — as one of the most important and economic contributions to the greater efficiency of modern transportation.

For QUICK HARDENING CONCRETE
For WATERPROOFING FROSTPROOFING AND FATTENING CONCRETE MORTAR and STUCCO
USE CAL
CAL
Ready for Work
the minute he reaches your job
WITH YOUR FAVORITE BRAND OF PORTLAND CEMENT

THE greatest speed consistent with safety is the paramount demand of every railroad in its work of concrete construction—Cal meets this demand.

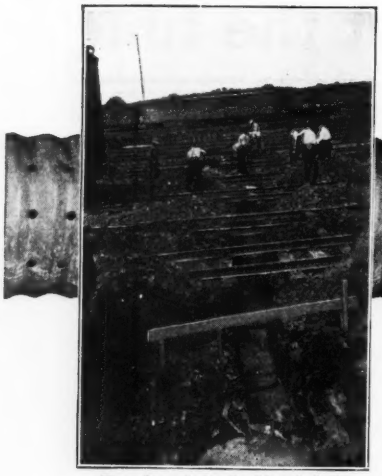
The use of Cal in culvert construction is a striking example of its outstanding value in relation to greater operating efficiency and economy—Here as illustrated traffic resumption depends upon the "fill," and the "fill" upon the curing time of the concrete.

Cal is a fool-proof admixture for Portland cement—its every property must appeal to the railroad engineer as a material aid in improving the permanence and durability of his concrete work. By its chemical action the set and strength of concrete are so accelerated as to allow quick use of the finished job. Drier consistencies may be used because of its workability.

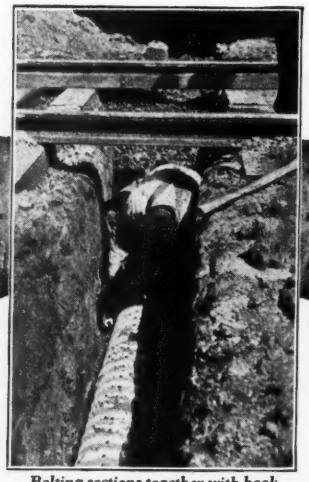
Cal is a white powder that requires no preparation on the job —accurately measured and added dry at the mixer its visability prevents omission or double treatment,—positive assurance of dense, lasting and beautiful concrete.

NORTH AMERICAN CEMENT CORPORATION
Successor to Security Cement and Lime Company
HAGERSTOWN, MD.
WASHINGTON BALTIMORE ALBANY

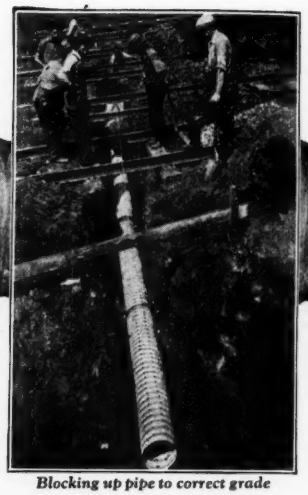
Now—



Trench ready for flexible sub-drain



Bolting sections together with hook couplers



Blocking up pipe to correct grade

Flexible Sub-drains that c

1—*Drainage Efficiency* 2

Multiple Track Drainage

Railway yards and multiple main line track present drainage problems to which corrugated iron drains are particularly adaptable. This durable pipe withstands weight, vibration and impact of traffic.

Tunnel Drainage

The difficult problem of draining tunnels is solved by the new flexible sub-drain. The usual open ditch is obviated and an unbroken, well-drained tunnel floor assured.

Side Ditch Location

In steep side hill locations, particularly in soft loam soils, these sub-drains may be used to prevent soil erosion.

Track Pan Drainage

A 10-inch corrugated pipe perforated as described is capable of draining 50 gallons per minute. This is ample to take care of tank leakage and the spill at 60 miles per hour, figuring a water waste of 25 per cent from the locomotive scoop.

Water Station and Industrial Trackage

Flexible sub-drains make possible better track maintenance wherever water tanks, dripping cars, or considerable amounts of water are spilled on the tracks. With these new sub-drains it is but a matter of seconds until this water is gathered and carried off the right-of-way.

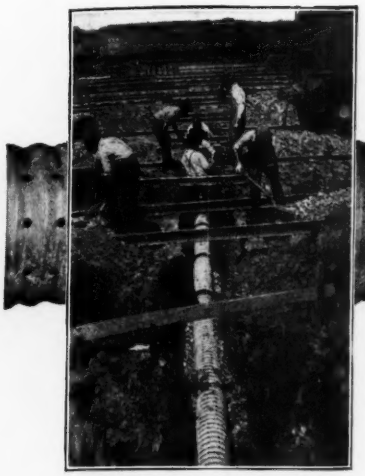
THE new Armco flexible sub-drains are revolutionizing the handling of sub-drainage.

Briefly, the essential features of the new method are the laying of corrugated iron pipe, perforated in each valley two-thirds of the way around the circumference of the pipe, and the filling in above these pipes with ballast to provide an open course for the water that has percolated down from the roadway.

Extensive tests have demonstrated that the difference in time between the application of water at the surface and its free flow from the discharge end is but a matter of seconds.

Water can enter the entire length of the pipe. Tight pipe joints insure against the entry of solid materials at these points. The bottom third of the pipe forms a solid iron wall. Fine materials cannot ooze up from below to block the flow of water.

ARMCO



Tamping pipe in place, showing perfect alignment

Filling in crushed ballast above pipe

Pipe ready for strenuous multiple track service

combine these three essentials

2—*Durability* 3—*Strength*

The pipe can be installed without traffic interruption. There is no necessity for preparing the solid foundation that is required when installing sub-surface drains that depend upon open joints for the entrance of water. In the case of the corrugated pipe any two points establish the grade. Uniform bearing is not necessary—the flexible pipe will not break. Two hook bolts connect the individual sections of pipe into one continuous length.

Complete details are given in the bulletin "Increasing the Efficiency of Roadbed Drainage," just issued. Every railway and road construction engineer should have a copy. The coupon is for your convenience.

ARMCO CULVERT & FLUME MFRS. ASS'N
Middletown, Ohio

Recent tests prove conclusively that flexible culverts are subject to smaller stresses under the exacting conditions of culvert service. The full data on these tests will be available soon. Check the coupon if you wish a copy of this important announcement.

Perforated Pipe

The solution of the sub-drainage problem

Armco Culvert & Flume Manufacturers Association, Middletown, Ohio.

Please send your bulletin "Increasing the Efficiency of Roadbed Drainage."

Name.....

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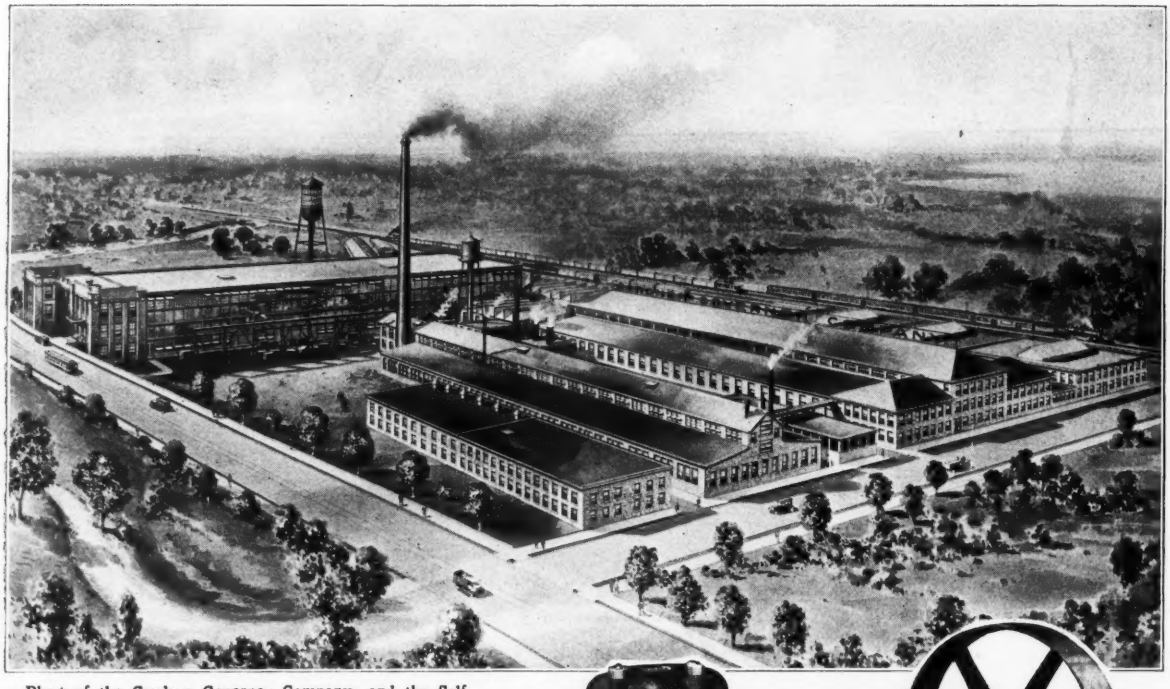
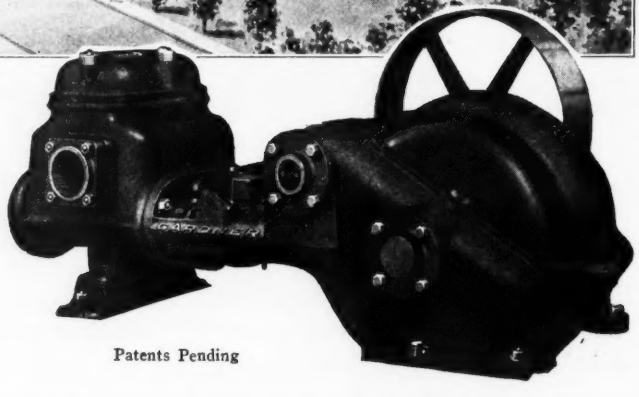
City..... State.....

☐ Check here if report on new strength tests is desired.



Plant of the Gardner Governor Company—and the Self Lubricating Pump which represents probably its greatest single achievement.



Patents Pending

Gardner Enclosed Self-Lubricating Power Pumps Are

BACKED BY SERVICE!

The life of a good pump is often from 15 to 30 years. Will the Manufacturer you buy from be in business 20 years from now, or will new parts have to be made to order?

We fully expect to be in business 65 more years to service your Gardner Equipment.

"Quality Builders for Over 65 Years"

THE GARDNER GOVERNOR COMPANY
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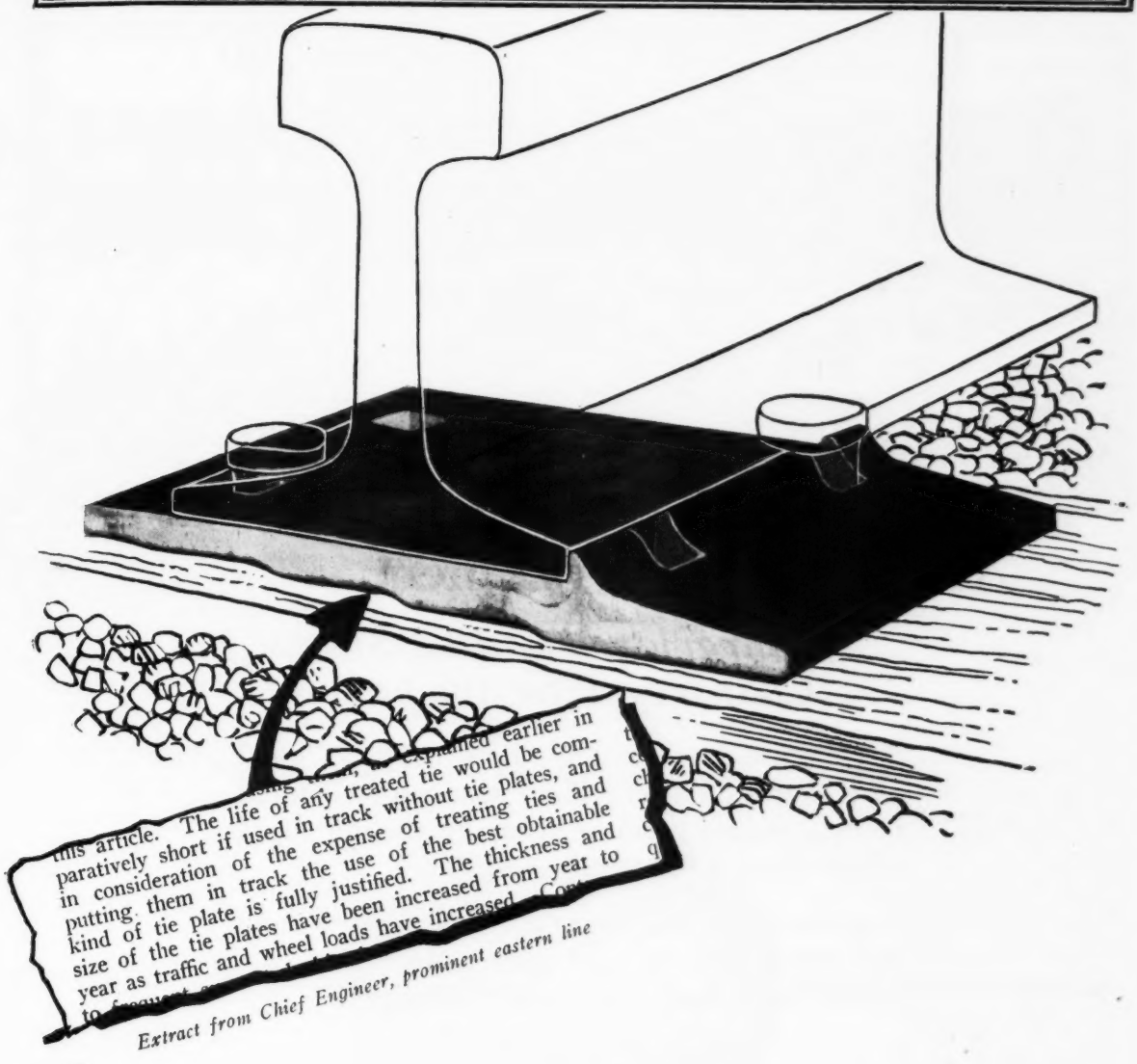
GARDNER
GOVERNORS
PUMPS-COMPRESSORS

GARDNER

The greatest protection against tie destruction



this article. The life of any treated tie would be comparatively short if used in track without tie plates, and in consideration of the expense of treating ties and putting them in track the use of the best obtainable kind of tie plate is fully justified. The thickness and size of the tie plates have been increased from year to year as traffic and wheel loads have increased.

Extract from Chief Engineer, prominent eastern line

LUNDIE TIE PLATE

Prevents cutting of a single fibre of the tie

The Lundie Engineering Corporation
285 Madison Avenue, New York
166 West Jackson Boulevard, Chicago

Ahead of the workmen

—*deliveries of United States Cast Iron Pipe are prompt!*

WHEN your specifications read "United States Cast Iron Pipe" you can be assured that the material will be ready for the job ahead of the construction gang.

Confidence in the knowledge that delivery dates will always be met is a great asset to the contractor and construction superintendent.

Write for "United States Cast Iron Pipe Handbook". It contains a wealth of valuable data.

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A Hyatt-Sized Job

WINTER frosts and thaws place a premium on the value of section crews. Swelling ties and loose spikes must be cared for, washouts and culverts repaired.

Give your men the right equipment for the job and their battle with the elements is made easier.

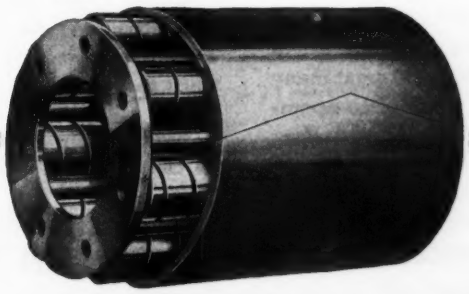
That is why railroads specify Hyatt Roller Bearings for maintenance cars. They give dependable, carefree service, year after year. No time lost tinkering with defective bearings. The only attention they require is lubrication every few months.

Hyatt equipped cars save 30% in gasoline bills because they reduce friction 50% over plain bearings. They are of ample capacity to handle frequent overloads of ties and rails, extra members of the crew and repair materials.

They represent sound, dependable investments which more than pay for themselves in several season's service.

HYATT ROLLER BEARING COMPANY

NEWARK DETROIT CHICAGO SAN FRANCISCO
WORCESTER PHILADELPHIA CHARLOTTE
PITTSBURGH CLEVELAND



Leading manufacturers build these sturdy bearings into new Maintenance Cars and furnish replacement boxes which may be readily applied to present equipment

HYATT
ROLLER BEARINGS

An Exhibit of Progress

NATIONAL RAILWAY APPLIANCES ASSOCIATION

COLISEUM — CHICAGO

MARCH 8-11 INCLUSIVE

Casey Jones INVITES YOU

Prosperity walks hand in hand with Progress. American railways have enjoyed a record breaking period which has been reflected in every line of manufacture.

Prosperity for the railways means Prosperity for the Nation. Increased revenues provide the means by which railways improve. Improvement means new ideas and new equipment.

Casey Jones has contributed a large portion of the progressive development in the railway motor car field. To replace inefficient motor car equipment, Casey Jones has produced special types of cars for every purpose capable of better service and at a much lower cost of operation.

We solicit a visit and inspection of our product by your engineering department to record the mechanical excellence, and of the purchasing department to witness the extraordinary value of their investment.

They will find evidence of development in motor cars which is remarkable. A great many of the improvements are the result of co-operation by the engineering departments of leading railways with our own.

Our exhibit of motor cars and equipment will illustrate the manifold improvements which have brought Casey Jones to the foremost rank and will be an interesting study for railway men.

This will be the first showing of a new and improved ball bearing belt driven section motor car engine. In design it is almost revolutionary as against types now in use. Such features as counter-balanced crankshaft, preheated crank case, cylinder and water hopper cast enbloc, produce a vibrationless engine, light in weight with plenty of power to handle a section motor car better and at less cost.

We will also show a most complete and improved section motor car, a light weight section motor car for small gangs, a light weight inspection car with power and capacity almost equalling a section motor car. All of these are of the efficient belt driven type.

In larger cars will be shown the Ford Motor equipped Casey Jones Heavy Duty Car, a car in a class by itself, and an electric power car capable of operating all kinds of electric driven track tools.

Every Casey Jones Motor Car is a leader in its class.

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FACTORY and GENERAL OFFICE ··· EAU CLAIRE, WIS., U. S. A.

Casey Jones REG. U.S. PAT. OFF.

MANUFACTURERS—RAILWAY MOTOR CARS

A 12 TAMPER GAS-ELECTRIC POWER CAR

For Year 'Round Use Before, During and After the Tamping Season

USES AS A POWER PLANT

Tamping track—will operate 12 Jackson Electric Tie Tampers for extra gang use.

Bridge construction and repair—will operate tools for drilling either steel or wood, scoring ties, grinding and tool dressing, rail and timber saws.

Rail cutting in or out of track—will operate a battery of ten Racine Rail Saws for cutting off battered rail ends.

Rail drilling—will operate electric rail drills of 1½" capacity, also bonding drills for signal service.

Changing angle bars—will operate nut wrenches for removing or tightening angle bar nuts.

Flood lighting—will operate flood lights for emergency jobs as washouts, wrecks, etc.

Supplies either direct or alternating current at 110 volts and will operate any standard electric motor driven appliance within its capacity, 7½ K.W.

As a work car—will transport with trailers up to 70 men or an equivalent load in materials at speeds of 5 to 30 miles per hour.

Light in weight, the car may be removed from the track by four men. It does not require a special foundation when operating as a power unit, but is placed on a standard motor car set-off.

This car is manufactured and guaranteed by the Northwestern Motor Company, Eau Claire, Wisconsin, the electrical apparatus being supplied by the Electric Tamper & Equipment Company.

ELECTRIC TAMPER & EQUIPMENT CO.

RAILWAY EXCHANGE **CHICAGO, ILLINOIS**

A line of Cast Iron Pipe supplying Selkirk Yard near Albany, N. Y.

Preferred by Discriminating Users

The railroads are among the largest consumers of water. Water is used for engine supply, for boiler water in power plants, for car washing and for passenger use. Many roads operate complete pumping and water treatment plants that are as large as those supplying good-sized cities.

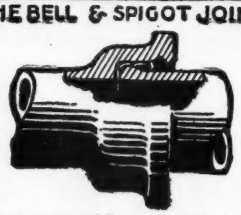
Their supply must not be subject to shut-downs for repairs to pipes because continuity of water supply is necessary to uninterrupted operation of trains. Contamination of the supply would bar its use for drinking purposes. Cast Iron Pipe is used for railroad supply lines because it can be counted on for continuous service, and can be relied upon to deliver the water in as good sanitary condition as it enters the pipe.

THE CAST IRON PIPE PUBLICITY BUREAU, Peoples Gas Building, Chicago

CAST IRON PIPE

Our new booklet, "Planning a Waterworks System," which covers the problem of water for the small town, will be sent on request

THE BELL & SPIGOT JOINT



THE ACCEPTED STANDARD FOR UNDERGROUND CONSTRUCTION

Send for booklet, "Cast Iron Pipe for Industrial Service," showing interesting installations to meet special problems

A test

Equip one or more divisions with Verona Track Shovels exclusively. After a few months, check up on their wear.

Note in general how well the Verona Shovels have stood the work. Note how very few have been destroyed by breakage, accidents, and the like. Note the increased amount of work accomplished by the men and the satisfaction they get out of using a well made and perfectly balanced tool. We will stake our business on such a test.

VERONA TOOL WORKS

See the advertisement on the next page and the one on the back cover of this issue.

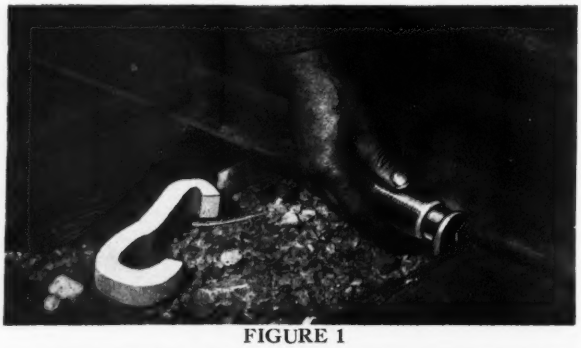


FIGURE 1

FIGURE 2

FIGURE 3

FIGURE 4

How the Ericson Rail Anchor is Applied

FIGURE 1.—The Ericson Rail Anchor is a simple, efficient, two-piece rail anchor with a malleable iron shoe which fits on the base of the rail and a heat treated forged steel yoke which holds the shoe in place.

FIGURE 2.— Drive it to full contact with the rail. Use an ordinary spike maul. No special tools are necessary.

FIGURE 3.— Pass the steel yoke under the rail with the large hook on the same side as the shoe. Hook the small hook over the opposite side of the rail base. Slide the yoke forward over the point of the Shoe.

FIGURE 4.— Drive the large hook of the yoke over the Shoe until it seats itself. Then strike the small hook; then the large; then the small; and thus continue striking the ends of the yoke alternately until the yoke is in the first position shown here (Second and third positions are for later adjustment if necessary). Never use more than one man to apply an anchor.

Strike the small hook last. The yoke should be left slanting across the rail with the small hook nearer the tie, and the yoke perpendicular to the inclined surface of the wedge.

To remove: Drive off the yoke in the opposite direction using alternate blows as in applying but striking the small hook first.

FIGURE 5.— Note position of shoe: Bearing face against tie and driven to full contact with rail base; Large hook of yoke driven up on shoe about 1 in. or a driving fit; Small hook driven slightly forward should be left slanting across rail with small hook nearer tie.

Proper care in application assures you of greater efficiency and less maintenance cost on all track devices.

The Ericson Rail Anchor actually prevents rails from creeping. In four years of service, no Ericson Rail Anchor has ever been reported to have slipped or become loose as a result of creeping pressure or ballast conditions.

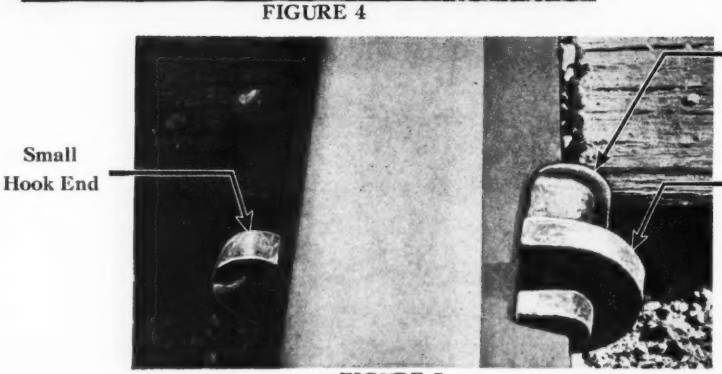


FIGURE 5

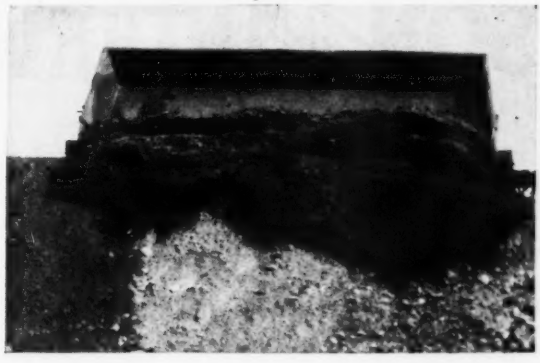
VERONA TOOL WORKS

PITTSBURGH, PA.

NEW YORK CHICAGO ST. LOUIS
SAN FRANCISCO NEW ORLEANS
BOSTON BALTIMORE DENVER
ST. PAUL LOUISVILLE EL PASO

See the advertisement on the preceding page and the one on the back cover

Dumps quickly but without destructive shock. Saves labor by dumping so far from the track. Keeps the ballast clean.



Car rides evenly at high speeds. Low height and stability and no chance for accidental dumping.

Differential Air Dump Cars

Dump farther from the track.

Tilt to a steeper angle insuring clean dumping of all classes of material.

Dump quickly and surely to either side.

Are inherently stable. Cars ride on four points directly over bolster side bearings.

Are lower and easier to load.

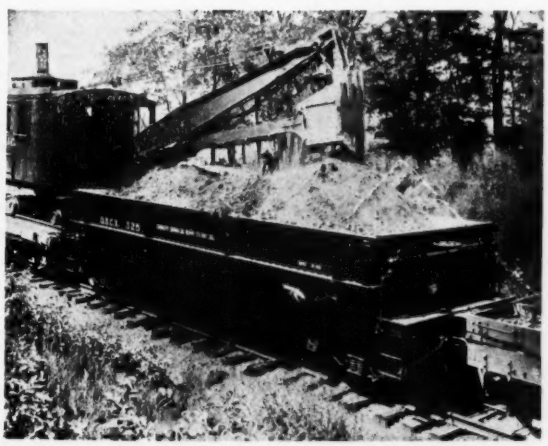
Have a smooth floor and clear discharge opening. All sizes of material easily dumped.

Have no locking mechanism to get out of order.

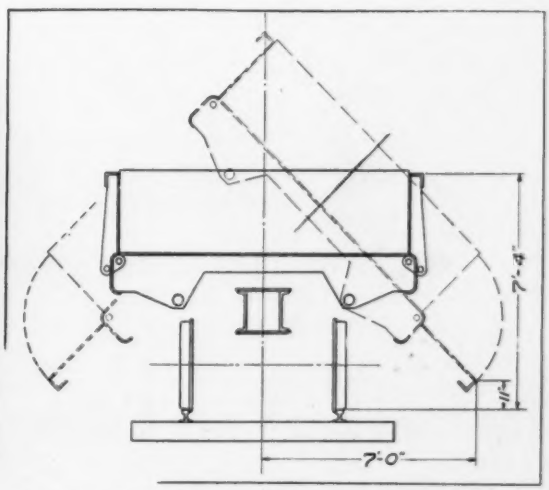
Are perfectly safe. Cannot dump accidentally.

Have a floor construction which enables them to stand up under the most cruel treatment such as heavy boulders being dropped into car.

Are extremely simple. Have fewer working parts.



This car is being loaded full length with standard ditcher. Capacity, level full, 24 cu. yds., crown loading, 36 cu. yards.



Dumping about trunnions located over gage line on dumping side instead of center line trunnions give stability and extra distance of discharge load from track.

THE DIFFERENTIAL STEEL CAR CO.

FINDLAY OHIO

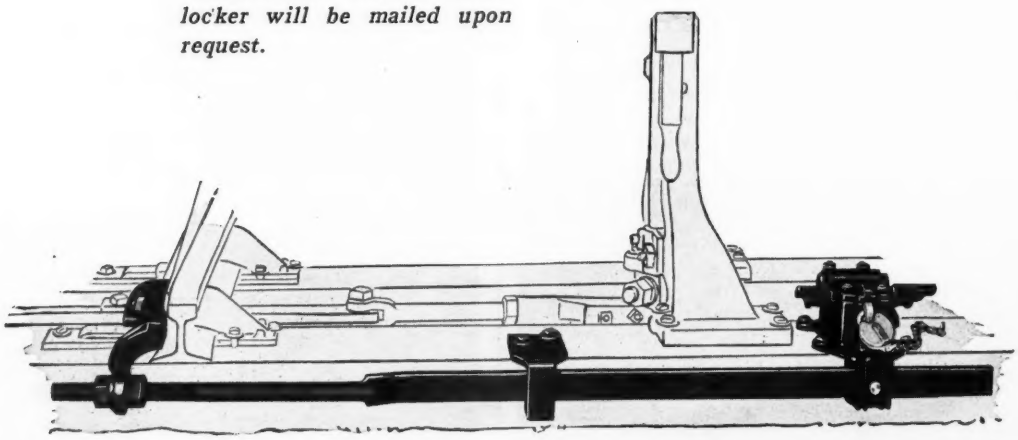
THE ANDERSON Switch INTERLOCKER

will be on display at the National Railway Appliance Exhibition, Coliseum, Chicago, March 8th to 11th, in Spaces 130, 131, 132, 133.

Here you can freely investigate the operation of this device which insures absolute switch safety.

You can see why the ANDERSON Switch INTERLOCKER is an economic device, as it can be used with any switchstand now in service. It is not a part of the switchstand, yet makes its operation foolproof.

Bulletin 101, describing the ANDERSON Switch Interlocker will be mailed upon request.



Manufactured Exclusively by

The American Valve & Meter Co., Cincinnati, Ohio, U. S. A.

Branch Offices:

Chicago, Ill., McCormick Bldg. Boston, Mass., Essex Bldg.
St. Louis, Mo., Chemical Bldg. Baltimore, Md., 724 E. Pratt St.
Denver, Colo., Barth Bldg. Richmond, Va., Mutual Bldg.
Roanoke, Va., First Nat. Bank Bldg.

Sole Canadian Representatives:

The General Supply Company of Canada, Ltd.
Ottawa Toronto Montreal Moncton

Extension Side Dump Cars

—Air Operated—

SPEED UP LOADING

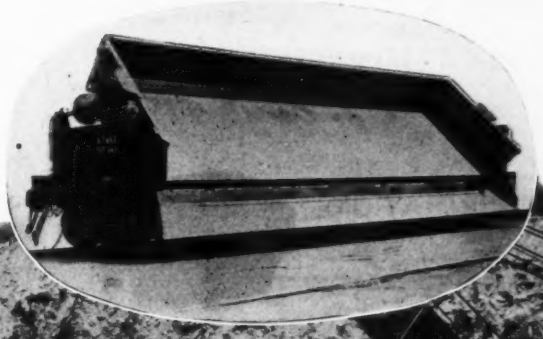
THE down turning door is an important feature of the Extension Side Dump Car. It contributes effectively toward securing maximum overall output from loading and unloading equipment.

Extension Side Dump Cars will dump safely any material the shovels can load because the door turns outwardly and downwardly while dumping, permitting the free and unobstructed discharge of the load.

Many expensive delays are thus eliminated—shovel output is increased, cars are loaded quickly and maximum overall output is secured.

CLARK CAR COMPANY
PITTSBURGH, PA.

New York 52 Vanderbilt Ave. Chicago 122 S. Michigan Ave. San Francisco Rialto Building



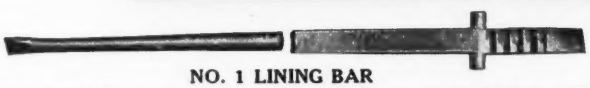
HACKMANN COMBINATION TRACK LINER

SAVES 60% OF YOUR LABOR AND TOOL COST

HACKMANN Track Liners Will Line Track, Frogs, Switches, Space Ties, Raise Low Joints, Without Disturbing the Road Bed. No Digging Necessary

60% Labor Cost Saved

3 Men With Hackmann Track Liners Do the Work That Required 9 to 12 Under the Old Method Hackmann Track Liners Will Pay For Themselves By the Saving in Labor Cost



NO. 1 LINING BAR

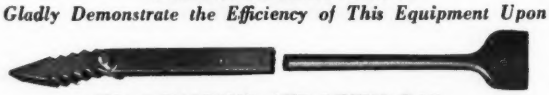
HACKMANN COMBINATION LINING BARS

(VERONA MADE—HEAT TREATED)

The No. 1 lining bar with chisel end and the No. 2 combination tamping and lining bar are drop forged from special steel specially tempered with 1-inch drop forged lugs as an integral part of the bars, for use with Hackmann bases.
Tests on different roads have proven conclusively that the new Hackmann Combination Track Liner gives more than double the efficiency of any liner now on the market.

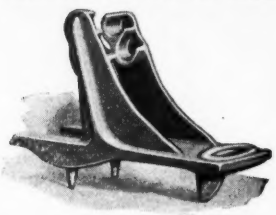
DEMONSTRATIONS

We Will Gladly Demonstrate the Efficiency of This Equipment Upon Request



NO. 2 TAMPING AND LINING BAR

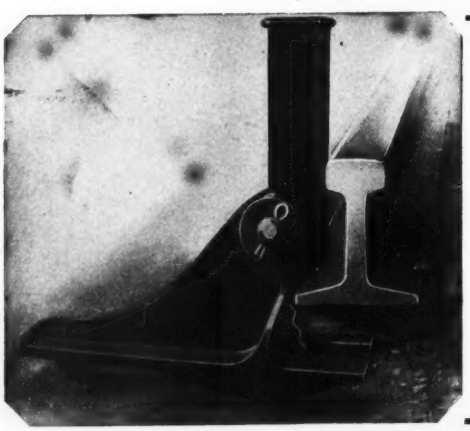
NOTE THE TWO STEP FEATURE AT TOP OF BASE



You can make at least two pulls without resetting the liner. Just move the bar to the top notch.

Weight 20 lbs.

MORE THAN 14,000 OF OUR LINERS NOW IN USE ON OVER 100 RAILROADS



The IDOL TRACK LINER

The Idol Track Liner will line track frogs, switches, space ties, raise low joints without disturbing the road bed as no digging is necessary. They will pay for themselves every day by work you will be able to do with a few men. They will save you 50% in labor costs.

The Idol Track Liner can be operated with any ordinary lining bar.

THE HACKMANN RAILWAY SUPPLY CO.

RAILWAY SAVING DEVICES—723 So. Wells St., CHICAGO, ILL.

FREDERICK HACKMANN.
President and Mechanical Engineer
J. J. FRANZEN,
Secretary and Treasurer

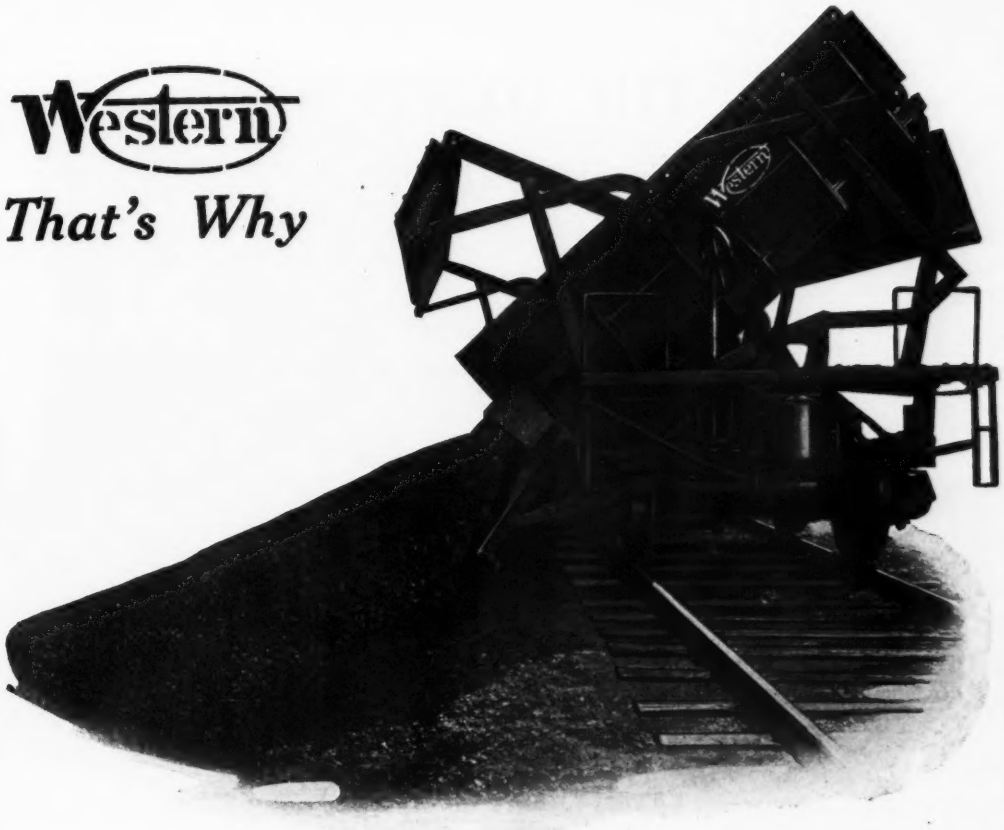
LAUGHLIN & CHENEY
Chicago, Ill
W. D. ACHUFF
St. Louis

BALDWIN LOCOMOTIVE WORKS
Foreign Representatives
WM. ZEIGLER CO.
Minneapolis, Minn.

THE HOLDEN CO. Ltd., Canada
Toronto Montreal Winnipeg
Vancouver

Western

That's Why



Easier and Cheaper

The same reasons that impel nine railroad contractors out of ten to use Western Dump Car Equipment in railroad construction applies with equal force to their use by the railroad Maintenance of Way Department.

Western two-way automatic air dump cars make work easier for the men and cheaper for the company.

Equipped for railroad use with 28-inch aprons to throw the load beyond the ballast.

May we refer you to railroads that are using them and that are enthusiastic over production and economy.

Western Wheeled Scraper Co.

Founded 1877

Earth and Stone Handling Equipment

AURORA, ILLINOIS

THE OXWELD RAILROAD SERVICE COMPANY

representing

THE LINDE AIR PRODUCTS CO.
(Linde Oxygen)

THE PREST-O-LITE CO., Inc.
(Prest-O-Lite Acetylene)

UNION CARBIDE SALES CO.
(Union Carbide)

OXWELD ACETYLENE CO.
(Oxweld Apparatus and Supplies)

Railway Exchange
Chicago

30 East 42d Street
New York

HART SELECTIVE CAR WITH "MAXENDS"

FOR BALLAST AND COAL

"MAXENDS" PROVIDE FACILITIES FOR PEDDLING BALLAST WHERE NEEDED, AS FLOW CAN BE CUT OFF AS DESIRED

DISTRIBUTING BALLAST TO CENTER AND TO ONE SIDE

Each side is operated independently in full view of the operator. Amount of distribution under control, as desired for shoulder reinforcement.

100% Side and Center Dump

Operating mechanism is absolutely self-locking. Load is carried on automatic safety locks—No dependence on chains.

Illustration shows actual work being done by this car, depositing material simultaneously to center and outside of elevated rail on curve for reinforcement.

Illustration shows same piece of track after car has passed. Note even distribution of material, no hand work having been done.

RODGER BALLAST CAR COMPANY

523 Railway Exchange, 80 E. Jackson Blvd., Chicago

The Biggest

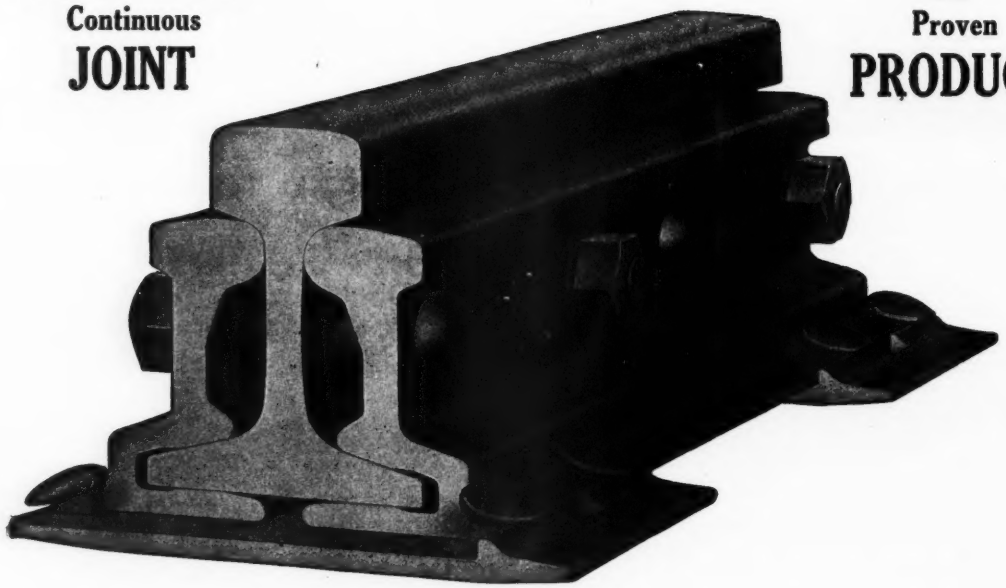
RAIL-TIE-ROADBED-JOINT

Saver

Ever Put on a Rail

HEAD-FREE
Continuous
JOINT

A
Proven
PRODUCT



A thorough investigation can save your railroad

A Lot of Money

The Rail Joint Company

61 Broadway New York City

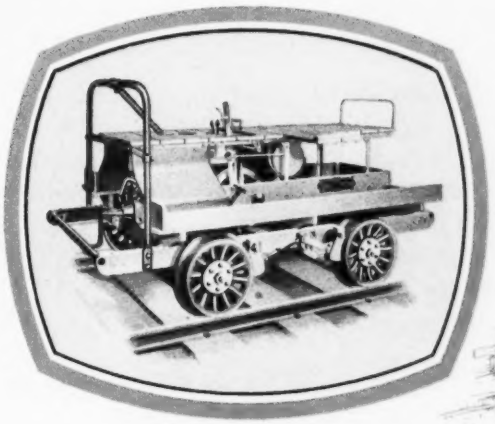
30 Years *on the rails* - *and still* first . . .

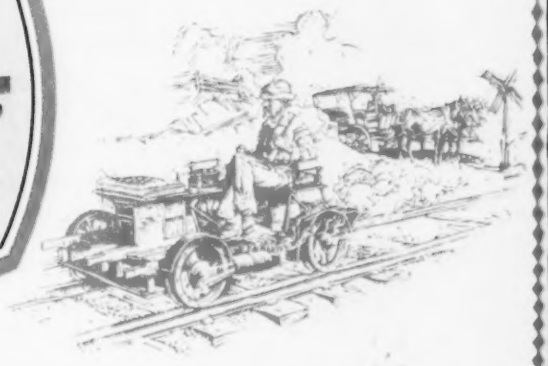
Go back a span of thirty years and you have the first gasoline motor car traveling the rails—a Fairbanks-Morse car—and a doughty pioneer it was. *First* in 1896 when "free silver" and rate wars were topics of vehement discussion.

First then—and *first* since—as shown by these high spots in F-M motor car history:

The first center load car was a Fairbanks-Morse car. Fairbanks-Morse was the first to use a water-cooled engine. The first to employ a gear drive—first to run on chain drive—first to have a free running engine—first with clutch drive—first with friction drive—first to have a 2-cycle engine—first to be equipped with a self-priming, easy starting engine—first to use wood center wheels—first to adopt pressed steel wheels—first to be built with pressed steel frame—first to install a clutch that can't burn out.

A formidable chain of "firsts" from 1896 to date, culminated now in the F-M complete line of motor cars—*first* to include a section motor car for every railway duty. A number of this Fairbanks-Morse pioneer motor car family—today's generation—are shown on the next page.

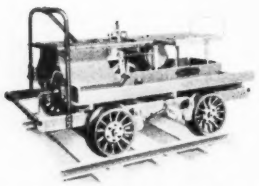




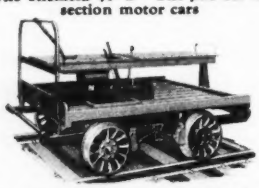
FAIRBANKS-MORSE
MOTOR CARS

First on the rails —and still first

For every duty



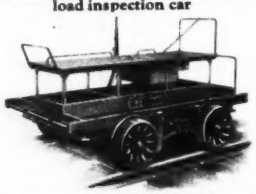
The Sheffield 40-B—The *fine* car of section motor cars



The Sheffield 45—Patterned after the 40-B but not as highly powered

The Sheffield 44—With the clutch that can't burn out

The Sheffield 41—*The* leading center load inspection car



The Sheffield 32—Has the lowest maintenance cost of any section car ever built

Pioneer on the rails—pioneer in the adaption of cars to special duties—the Fairbanks-Morse line of Sheffield motor cars provides all that can be asked in motor car performance for every type of railway duty. From the Sheffield 40-B, the *fine* car of section motor cars, to the Sheffield 32, the *economy* car—these section motor cars are outstanding for their durability. Built to rigid, old-time ideals of stand-up ability, Sheffield cars possess all the developments and refinements approved by the best automotive engineering practice of today. These are evidenced in pressed steel auto type frames—in three-point suspension of engine and simple, fool-proof transmission in the "40-B"—in the simplified construction of the "45" with provision for greater deck space—in the indestructible clutch that can't be burned out in the "44"—and other outstanding features in every model.

Thirty years' experience in construction, coupled with painstaking check-up from the field, has brought these cars to an unequaled state of dependability and mechanical perfection. This 30-year "test run" is a vital protection to section car buyers. In the Sheffield line are available cars that have always been leaders—and that are still first on the rails today.

FAIRBANKS, MORSE & CO., *Chicago*

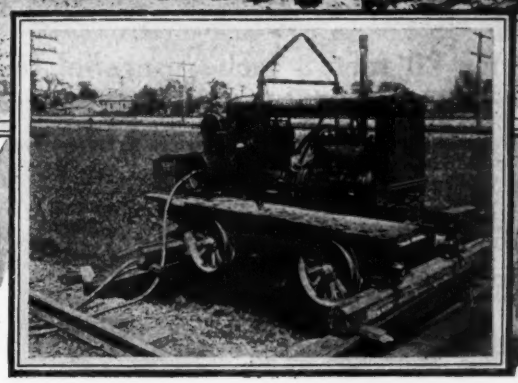
Manufacturers of railway motor cars; hand cars; push cars; velocipedes; standpipes for water and oil; tank fixtures; oil engines; steam, power and centrifugal pumps; scales; complete coaling stations

FAIRBANKS-MORSE
MOTOR CARS

First on the rails — and still first

A-929

PNEUMATIC TIE TAMPING



Above: Four Pneumatic Tie Tampers operated from Size 5½"x5" Tie Tamper Compressor.

Left: Size 5½"x5" Compressor with flanged wheel mounting and lifting bale as used in track work.

The most economical way to make good track

Ingersoll-Rand Pneumatic Tamping Outfits not only speed up the tamping, but produce a more even and more uniformly tamped track which stands up twice as long as that tamped by hand.

One road reports, "It has been definitely proved that four men with pneumatic tampers will tamp more track per day and do a better job than 12 to 16 men using hand picks and bars. With the untiring power of compressed air, a firm and solid bedding is secured which other tamping cannot equal."

Descriptive Bulletins sent on request.

INGERSOLL-RAND COMPANY—11 BROADWAY, NEW YORK CITY

Offices in principal cities the world over

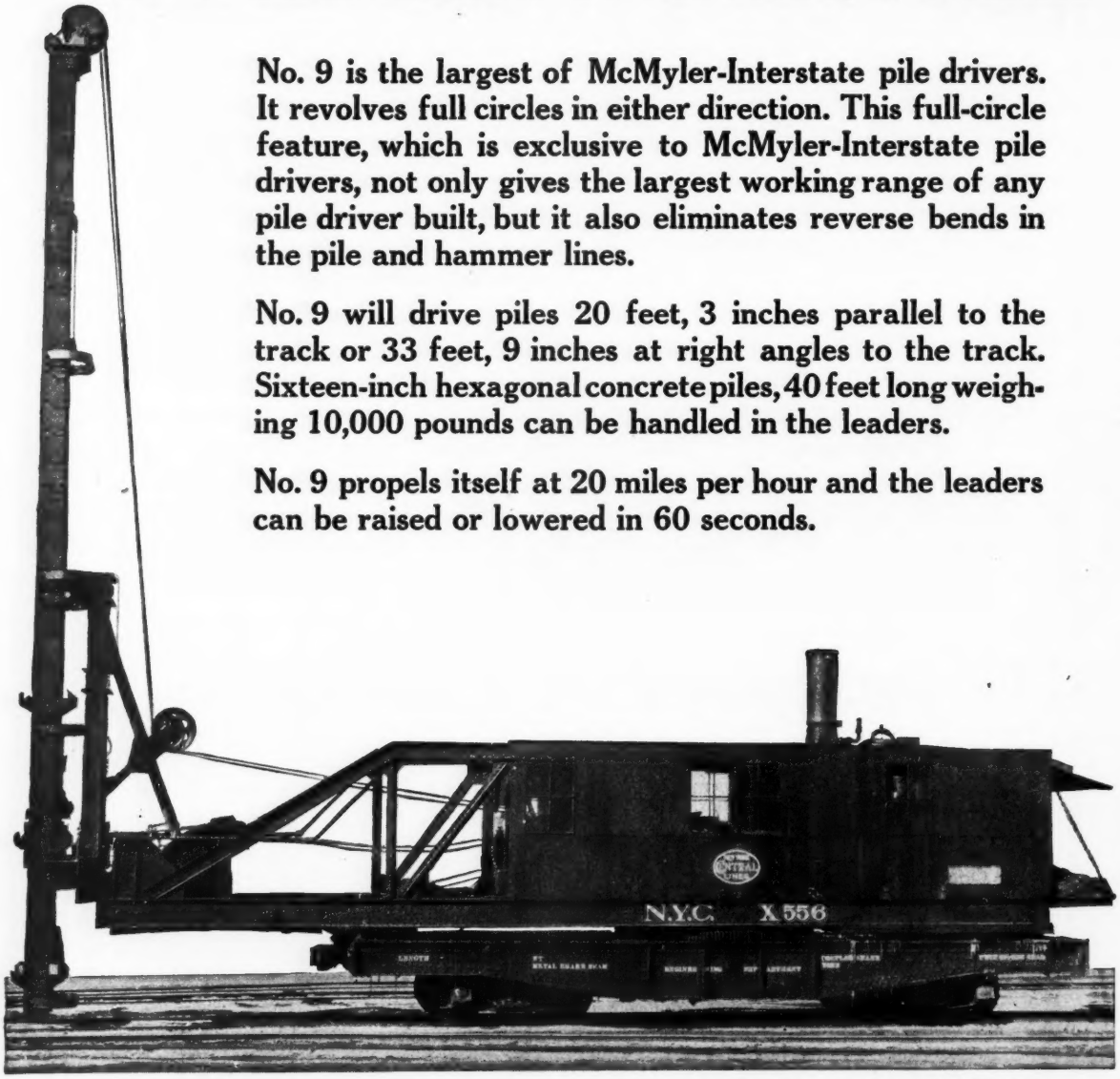
FOR CANADA REFER—CANADIAN INGERSOLL-RAND CO. LIMITED, 260 ST. JAMES STREET, MONTREAL QUEBEC

221-TT

Ingersoll-Rand

No. 9- a Full Circle Pile Driver

WITH A SIDE REACH OF 33 FEET, 9 INCHES



No. 9 is the largest of McMyler-Interstate pile drivers. It revolves full circles in either direction. This full-circle feature, which is exclusive to McMyler-Interstate pile drivers, not only gives the largest working range of any pile driver built, but it also eliminates reverse bends in the pile and hammer lines.

No. 9 will drive piles 20 feet, 3 inches parallel to the track or 33 feet, 9 inches at right angles to the track. Sixteen-inch hexagonal concrete piles, 40 feet long weighing 10,000 pounds can be handled in the leaders.

No. 9 propels itself at 20 miles per hour and the leaders can be raised or lowered in 60 seconds.

Locomotive Cranes • Power Shovels • Crawler and Tractor Cranes • Clam-shell Buckets
Orange-peel Buckets • Structural Steel • Car Dumpers • Pile Drivers • Railroad Equipment
Forgings • Coal and Ore Bridges • Barge Cranes • Wharf Cranes • R. R. Turntables

PD-9

McMyler-Interstate

NEW YORK BUFFALO PHILADELPHIA PITTSBURGH CLEVELAND DETROIT CHICAGO SAN FRANCISCO

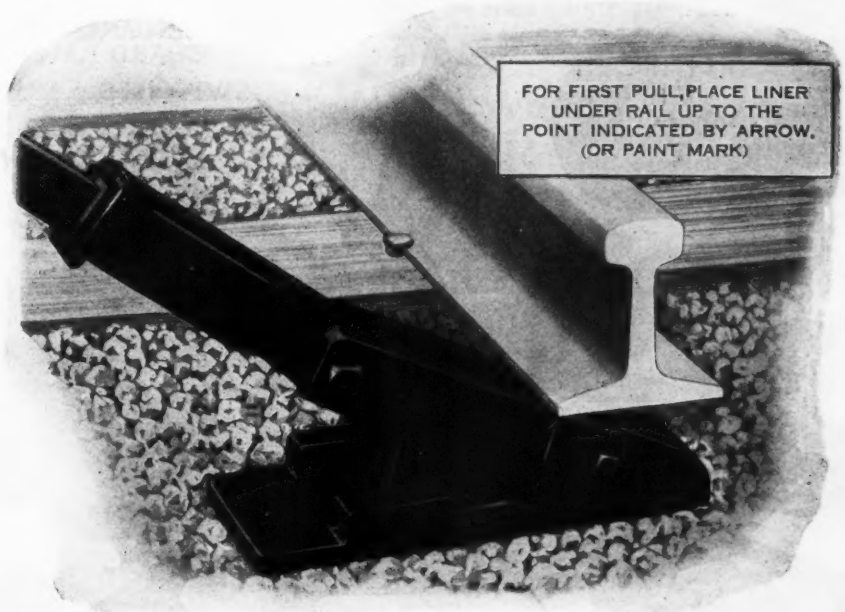
BUDA
ESTABLISHED
1881

Buda-Clark Track Liner

Lines Track With the Least Amount of Time and Energy

Does not have to be removed from the track for passing train.

Ask for Bulletin 502



The Two Essentials of Good Riding Track are:

1 GOOD LINE
2 GOOD SURFACE

Most Work With Least Effort

THE BUDA COMPANY

HARVEY (Chicago Suburb) ILLINOIS

30 Church Street NEW YORK
Railway Exchange CHICAGO
Railway Exchange ST. LOUIS
644 Mission St. SAN FRANCISCO
LONDON

RACOR

SEVEN WORKS
RAMAPO-AJAX-ELLIOT
HILLBURN, NEW YORK
NIAGARA FALLS, N.Y.
CHICAGO, ILLINOIS
EAST ST. LOUIS, ILL.
PUEBLO, COLORADO
SUPERIOR, WISCONSIN
NIAGARA FALLS, CANADA

HEAVY DUTY HEAT TREATED GUARD RAIL CLAMPS
DROP FORGED RAIL BRACES
ADJUSTABLE RAIL BRACES
EUREKA ADJUSTABLE CLIPS
MANGANESE REINFORCED SWITCH POINTS
RAMAPO AUTOMATIC SAFETY SWITCH STANDS
AJAX MANGANESE ONE-PIECE GUARD RAILS
SWITCHES – FROGS
CROSSINGS – SPECIAL
RAILWAY TRACK WORK

RAMAPO Safety Switch Stand *Style No. 17*

RACOR Heat Treated Heavy Duty Guard Rail Clamp

RACOR Drop Forged Rail Brace

RACOR Adjustable Rail Brace

RAMAPO Safety Switch Stand *Style No. 20-B*

AJAX MANGANESE One-Piece Guard Rail

EUREKA ADJUSTABLE Open Side Switch Clip

RACOR TRADE MARK REGISTERED

Main Office – HILLBURN, NEW YORK
SALES OFFICES AT WORKS, ALSO
30 CHURCH STREET, NEW YORK
McCORMICK BUILDING, CHICAGO

RAMAPO AJAX CORPORATION

Before drainage—wet, soggy roadbed; a source of constant danger and costly maintenance.

After drainage—the same roadbed; dry, safe and maintenance eliminated. Dickey Track Drainage made this possible for a southern railroad.

A Sure and Economical Cure

For Chronic Dropsy of Roadbed

Water draining from cut shown above in photo No. 1. Removal of this excess water makes possible the excellent condition apparent in photo No. 2.

The Dickey System of Track Drainage reduces maintenance costs sharply and continuously. The comparatively small initial expense is justified over and over again, year in and year out.

The need for Dickey Track Drainage is self-evident and conceded on every railroad. Ineffectual measures to relieve wet track are far more expensive than permanent relief by the Dickey Clay Pipe Method.

Let us explain the everlasting economy and satisfaction of Dickey Track Drainage

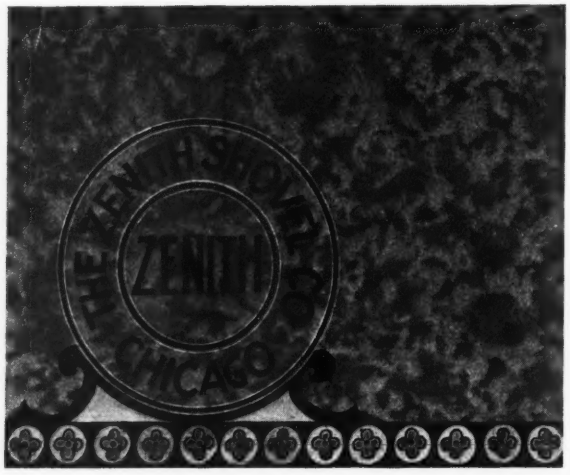
W. S. DICKEY CLAY MFG. CO.

Established 1885

BIRMINGHAM, ALA.
CHATTANOOGA, TENN.
KANSAS CITY, MO.

CHICAGO, ILL.,
111 W. Washington St.
MACON, GA.
TEXARKANA, TEX.

See our working model showing drainage of ballast pockets drained by sewer pipe at A. R. E. A. Convention, space No. 116.



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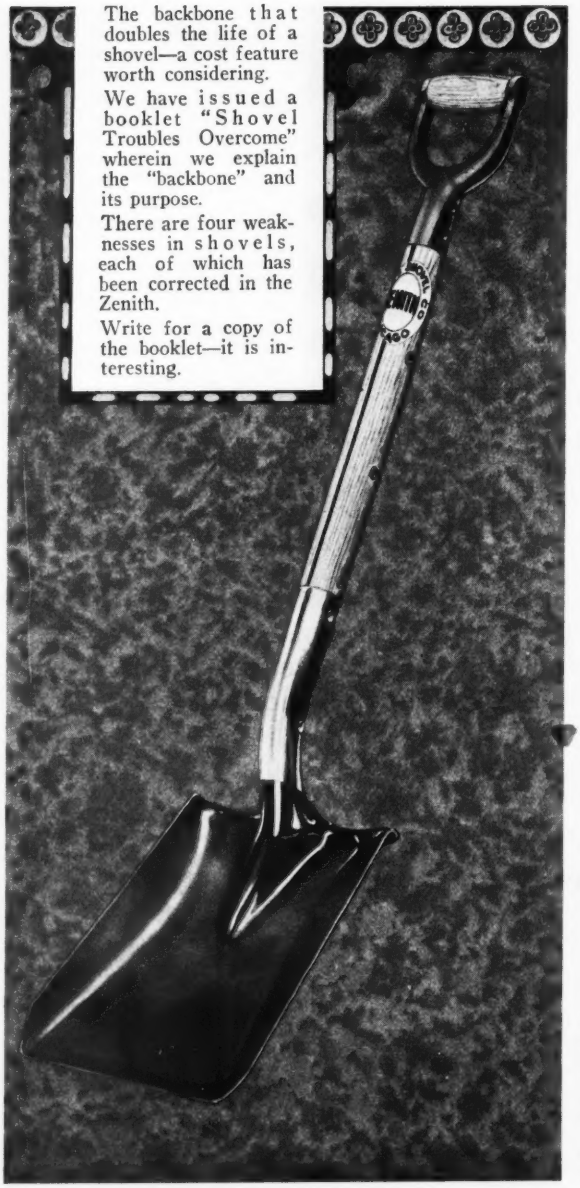
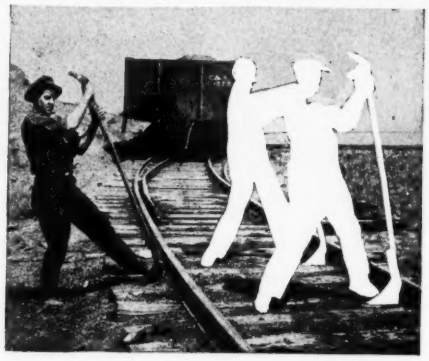


BLOXHAM TRACK LINERS



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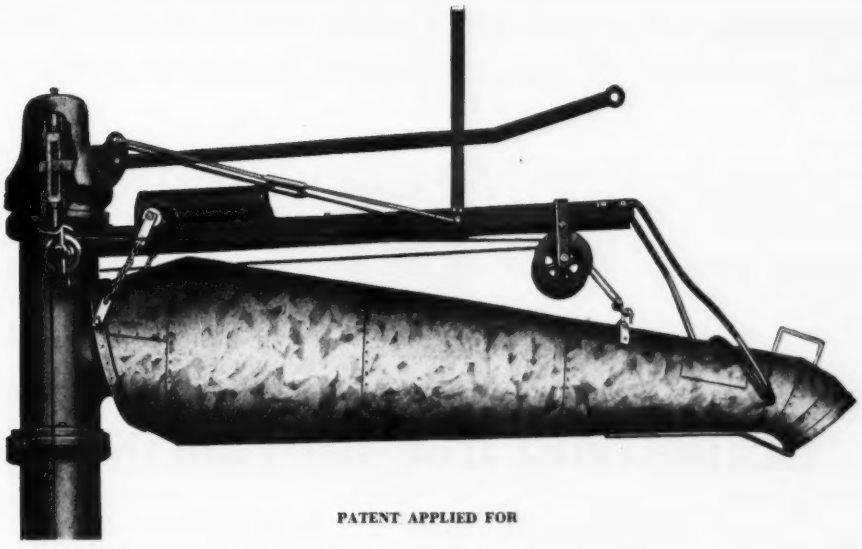
The Bloxham Track Liner. There are two styles, one for rock ballast and one for gravel or stone.

REM 2-C-RTG



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Railway
Engineering and Maintenance

Volume 22 February, 1926 Number 2

THE HYDRAULIC RAM IN WATER SERVICE

THE FIRST hydraulic ram was built in 1796 and since that time this simple, efficient and economical device for pumping water has been widely used. However, there are probably few men in railway water service who ever have seen a hydraulic ram in operation and fewer still who have had to operate or maintain one. The reason for this is plain. The ram can be used only where the water supply meets certain specific requirements, a stream with considerable fall and having a minimum discharge several times as large as is required. Obviously, this condition is not often realized and in some parts of the country almost never.

Because hydraulic rams are used but rarely in many parts of the country the possibility of their use under conditions well suited to them could very easily be overlooked entirely by those charged with the development of the supply. It is for this reason that we call attention to the marked economy obtained on a division of the Canadian National in New Brunswick, following the substitution of hydraulic rams for other types of pumping equipment at nine water stations. The saving demonstrates what can be done where conditions are favorable to the use of such equipment.

AMERICAN EXTRAVAGANCE

WHEN STUDYING maintenance of way practices in England last summer a prominent American engineer became much interested in the service that was being secured from cross ties in that country. When in company with a division engineer on an English road he came upon a gang renewing ties out of face. Seeing a tie that interested him particularly, he asked his escort to cut sections from under the rail bearing of the tie for him to take with him. The division engineer replied that this was impossible, for the ties were too valuable. The American then offered him the price of the tie, approximately $1.25, when the English officer stated that even though he was a division officer he was required to account for every tie and could not dispose of a single one. On inquiry at the general office later the American found that this was true and that it required an order from headquarters to enable him to secure the cut sections he desired from this tie.

It is not surprising that with this care of materials 25 per cent of the ties released when the tracks are renewed out of face at intervals of 20 years are found fit to return for another 20 years of service, while nearly all of the remainder are in sufficiently good condition to warrant their being converted into fence posts, slats and other products.

We have long been known as an extravagant nation but with the rapid depletion of our forests and the rising prices of ties and other timber products we will soon be forced by economic and other considerations to adopt many of the practices followed in Europe to retard the destruction of ties and to increase the service secured from them. When this development comes, not the least of the advantages will be the reduction in the amount of labor that will be required to renew these ties, a consideration often lost sight of in considering the cost of cross ties.

DISTRIBUTE THEM CAREFULLY

ONE OF THE tasks that can be completed during the winter and thus reduce the demand on the time of the section gangs in the spring is the distribution of ties. On many roads this work is done or can be done during the winter. Where this is possible the track forces can save much time for themselves later by distributing the ties accurately with reference to the point of their use. By piling them as close as possible to the point of their insertion much carrying can be avoided later in the spring. They can also be distributed so that the larger and more durable ties are available for use under the joints and at other places of severe service. As long as hewed ties are used they will vary in quality and the foreman who recognizes this in distributing them will have the most uniform and easily maintained track. The distribution of ties may be considered a routine task that does not require much attention, but the reverse is true for the foreman who gives to it his close attention will save many hours for his gang at a later period when they can ill be spared.

EVERYONE HAS A CHANCE

THE PERSONAL news section of this issue presents a record of an unusually large number of promotions in engineering and maintenance of way positions. While such changes are presented from month to month, the large number appearing in this issue gives more than usual prominence to the fact that the railway industry means much in the lives of many men. But that is not all that is to be learned from a reading of the personal news columns. Another fact that stands out prominently is that there is no royal road to success in railway service. Instances are brought to light occasionally of what might be called meteoric careers, but these are clearly the exception. In the vast majority of cases the man promoted to the position of supervisor, division roadmaster or division engineer has demonstrated his ability over a period of years sufficient to leave little doubt as to his capacity for greater responsibility. A reading of these sketches will show also that promotions are not made according to any formula or established rule. In some cases the men are graduates of technical schools, but in many they are not. This bears out the findings of the

investigation made recently under the auspices of Yale University for the purpose of ascertaining the field for college graduates in railway service, namely, that the managements of the roads are not interested in setting up a "West Point" system for the development of officers. They have shown clearly that they wish to leave the gate open for everyone.

WE HAVE ONLY MADE A START

THE REPORTS of the Wood-Preservers' annual conventions have come to be regarded as recurring records of the progress being made in the preservative treatment of wood, particularly as used for railway cross-ties. This record has been made more tangible in recent years by the presentation of a table of average annual tie renewals per mile of track—this year covering 24 roads. This table, which is reproduced in this issue, is worthy of careful study. The primary fact to be noted is that real progress is being made. The average tie renewals are being reduced from year to year at an encouraging rate. What is of equal interest is the wide disparity of the averages for individual roads. However, unless considered in the light of the various factors which influence the rate of tie renewals there is danger that such a comparison may lead to unwarranted conclusions.

It is true that, other things being equal, that road which has been committed to the preservative treatment of its ties for the greatest number of years and has protected them from mechanical injury insofar as it is reasonably possible to do so, will, in general, have the lowest average annual renewals per mile. However, the average renewals given in the table may be lower on one road than on another because of deferred renewals or a lower standard of tie condition. On the other hand a road having lines in territory subjected to heavy rainfall and high temperature will necessarily have greater average tie replacements than one with lines in a colder and drier climate.

While a gradual reduction in tie renewals from year to year is an encouraging condition, it may almost be said to represent but a start. If all the roads had records as good as those which obtain the best results, the general average of renewals would be much lower than it is now, but even this would be much greater than that which European roads have been obtaining for many years.

THE HAZARD OF A DAMAGED RAIL

WHILE TIES usually suffer the most conspicuous damage from derailments, injury to rails from this cause is of a more serious nature for the very reason that it is not conspicuous. After a wreck has been cleaned up and the ballast carefully dressed about the only clearly visible evidence that any trouble had occurred are the lines of wheel marks cut in the faces of the ties by derailed wheels. However, close examination may disclose small nicks or dents in the flanges of the rails, or even places where little chips or slivers have been cut off the edges of the flanges. In many cases these marks may all be so small as to be deemed of little consequence.

Now the question arises as to just how harmless such injuries are. Judging from the experience of some, minor injuries of this kind sometimes lead to rail breakages, not always at once but sometimes long after the injury occurred. Some railways, in fact, maintain rigid rules governing the removal of rails subjected to injury, especially where it resulted from a blow, such as that produced by a broken wheel, and particularly where evidence of the blow is found on the flanges.

However, the replacement of any considerable number of rails subjected to minor injuries is not without its obstacles. Reports of minor derailments do not always get beyond the limits of the division. Therefore, a requisition for the necessary new rail to replace rail injured in a derailment would call for explanations which otherwise would have been unnecessary and which it was hoped to avoid.

More than one supervisor or roadmaster has found himself in this predicament. He realizes that he is more responsible than anyone else for the safety of tracks on the division and he probably understands better than anyone else the hazards of these minor injuries to rail. Yet the easiest thing for him to do is to forget it. But he should not allow questions of expediency to overcome his sense of responsibility in a question of so grave a nature.

MECHANICAL EQUIPMENT IN BRIDGE WORK

ANYONE WHO has been associated with maintenance of way work for the past 20 years can call to mind at once any number of things which mark the progress made in the development of track materials and equipment during the past two decades. Motor cars, treated ties, rail anchors, power ditchers, chemical weed killing and rail laying machines are all items having to do with track or track work, which either had their beginning during that period or had passed from the stage of experimentation to one of practical use. In addition, more recent years have seen the development of a wide variety of tools applicable to track maintenance work.

Can the same thing be said of the bridge and building department? Has its work undergone any marked change from the methods pursued 20 years ago because of the introduction of new devices and materials?

As regards materials of construction, the answer is in the affirmative. Bridge and building maintenance has been subjected to the changes incident to a change in the character of the structures. Twenty years has seen a pronounced increase in the number of concrete and creosoted bridges, and a marked change in the character of buildings. New designs and types of flooring, roofing, window sash, ventilators, wall construction, while giving rise to fewer demands on the maintenance forces, have imposed problems of a different character.

As regards tools and equipment used in construction and repair work on bridges and buildings, the answer is not so favorable. Better concrete mixers, with modern accessories and a more general use of such machinery, has made for a saving in labor in concrete work. A transition from occasional to almost invariable use of pneumatic tools in steel bridge erection and the development of more perfect tools have served to increase the efficiency of steel bridge erection, repair and dismantling. The locomotive crane has had its part in increasing the economy of this and other lines of work involving the handling of heavy material.

However, when it comes to the construction and maintenance of wooden bridges there is little in the way of progress to record. It is true that better pile drivers are to be had, but except for the tendency towards more efficient pile driving equipment the building and repair of pile and frame bridges is now carried on about as it always has been. Power hoisting equipment and power tools have as yet gained little more than a start in such operations.

It may be argued that work on wooden structures of modern size does not lend itself readily to the use of any other equipment than that which has been used for cen-

turies. Witness the continuous use of the hand hammer, saw and plane on even the largest building operations. It may be that the necessity for avoiding interference with traffic is a consideration far outweighing the economies attending the use of equipment occupying the track for any considerable periods of time. A more valid explanation may be found in the fact that power tools have not yet been made mobile or that railway bridge men have not adapted their work to the application of portable power tools in a way that makes for the complete success of such equipment in the trials that have been carried out thus far. But, whatever the reason, it would seem that bridge work lags considerably behind track work in the modernizing of the methods of doing work. Here is a fertile field for improvement and development on the part of railway men, as well as manufacturers.

IS WINTER WORK PRACTICAL?

WOULD IT BE to the advantage of the railways to do a larger part of their maintenance work in the winter? If so, is it practical to transfer some of it from the more active summer season, and if this is possible what operations can be transferred to the best advantage? These are questions that are very much before maintenance of way men at the present time. A number of roads have found it possible in late years to do more work in the winter than they thought possible a decade ago. On other roads little or no attention has been given to this subject and it has been discarded as impractical because of long established habits.

The best way to decide whether it is practical to do more work in the winter and to determine which task can be done advantageously at that season is to study the results that have been secured where this plan has been tried. To offer an incentive for the collection of such information on work of this character that may now be under way, we announce a contest on The Practicability of Increasing the Amount of Work That Can Be Done In the Winter. For this contest we solicit discussions of all phases of this subject, bringing out the limitations and disadvantages, as well as the advantages, of this practice. While abstract discussions of this subject will be welcome, the judges will give special consideration to these contributions that contain information drawn from actual experience. To stimulate interest in the subject we announce prizes of $35 and $25 for the first and second best papers submitted, respectively, while all others accepted and published will be paid for at our regular space rates. All contributions should be sent to the editor of *Railway Engineering and Maintenance*, 608 South Dearborn Street, Chicago, and must be received on or before April 1 to be considered by the judges.

STANDARD COLORS

IS A RAILWAY warranted in going to any effort to improve the appearance of its buildings, or should it be prompted by strictly utilitarian motives? It requires only limited travel over various railways to demonstrate that the latter idea has prevailed very largely, for structure after structure is found to be painted with "box car red" or other "standard" colors. While such standards enable the structures of one road to be distinguished from those of another, a study of the combinations selected indicates that they were chosen more for their low first cost and durability than for their attractive characteristics, as is evidenced by the fact that these colors and combinations of colors will not be found on the homes of the railway officers responsible for the selection of colors for their roads.

While the standard colors have advantages to commend them to a railway with a large number of buildings to maintain, it is questionable whether, like other standards, they are not adhered to so closely that the appearance of the property suffers. Rather, it is questionable whether the condition of the property would not be improved by allowing some maintenance officer a reasonable amount of latitude in the selection of the colors for those stations exposed most directly to public view and used most largely by the public, at least at the more important points. Indicative of the improvements that may be made may be cited some work done on the Lehigh Valley recently and described briefly in the What's the Answer columns. Few structures present a more unsightly appearance than old brick buildings. Yet the Lehigh Valley, in common with many railways, has a number of stations of this construction that are adequate for their needs and for this reason have been carried over from year to year. To improve the appearance of these buildings the Lehigh Valley has hit on the expedient of painting them with a three-tone effect by applying a second coat of two slightly different shades to about 10 per cent of the brick and lining up the joints with white lines. The result is a decidedly attractive effect which stands out in marked contrast with the typical flat walls so commonly found, while with the application of the first coat by means of a paint spraying machine the cost is only slightly above what it would have been for a one-coat brush job. The railways can do much to improve the appearance of their properties with little if any additional cost by encouraging the adoption of expedients such as this under reasonable supervision.

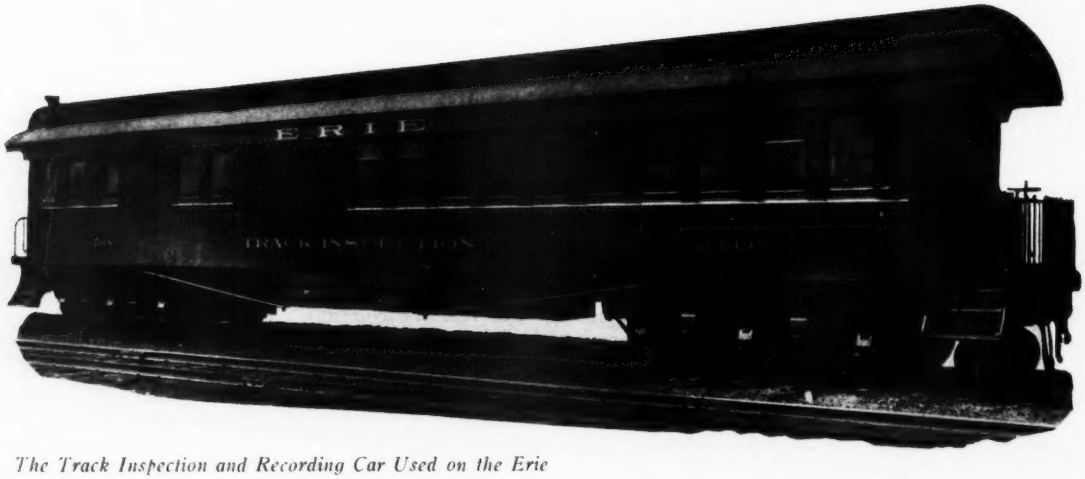
ARE TRACK INSPECTIONS WORTH WHILE?

THE PAPER by H. D. Row on the value of annual track inspections, which is presented elsewhere in this issue, summarizes in a most effective way the considerations which have prompted a number of railroads to give these inspections increased prominence by using them as the basis for the award of prizes. But this practice does not stand alone on the merits of the arguments presented by Mr. Row. The fact that they have been continued by these roads year after year, in some instances for more than a quarter of a century, indicates that the managements of these roads have found them to be of value.

Not the least of the advantages of track inspections is the fact that they give the maintenance forces an objective to work to. The inspection date is recognized as the date when the season's major improvement work must be brought to a close and the property placed in the best possible condition. If this date is properly selected it stimulates action among foremen who might otherwise be inclined to let their work drag into the winter.

A further advantage of track inspections is the promotion of uniformity in conditions. The critical examination of the property, section after section and subdivision after subdivision, emphasizes variations in standards and thus focuses attention upon those portions of the line that are below standard. The comparison is particularly effective as between subdivisions if the supervisors are members of the inspection party and likewise as between sections if the foremen participate.

A still greater advantage of these inspections is the friendly rivalry which is stimulated. Whether the reward is in the form of cash, medals or recognition among his associates, the effect is to create a healthy competition which is reflected in greater effort. There is a desire to excel in all normal men and the healthy spirit of competition that is engendered is the result.



The Track Inspection and Recording Car Used on the Erie

Are Prize Awards Worth While?*

An Answer to this Question, Based on the Results Obtained by the Erie With a Mechanical Registering Car

By H. D. ROW
Division Engineer, Erie, Huntington, Ind.

IS AN ANNUAL track competition and inspection of mutual benefit to the railroad and its track department employees? I believe it is, having reached this conclusion after observing for the past 12 years the results of track inspections conducted by means of a special train on the Erie, in which a mechanical registering car is the most important feature.

There have been times when I have doubted the practicability of track inspection prize awards. This statement is made because I believe that many maintenance of way officers are of the same opinion. With a proper method of making the awards there should be little opportunity for mistakes. Therefore, the objection to a purely impersonal and impartial system of prize awards must arise primarily from a sympathetic feeling engendered by the numerous disappointments which result, to the end that these are considered to outweigh the satisfaction of the few who win the prizes.

Where a system of annual awards has been in progress for a number of years on any railroad I doubt if any members of the maintenance of way department desire to see it discontinued for the reason that the benefits derived outweigh so greatly the disadvantages and disappointments. It may be that the system of award in vogue on the Erie can be bettered, but I believe that it is either correct or as nearly so as any method that has been devised thus far.

A Mechanical Record of Marked Advantage

In order that the prize awards shall be impersonal and impartial, so far as it is possible to make them, I believe that a mechanical registering car such as is used on the Erie is of primary importance, since it affords a correct record of variations in gage, cross surface and the depression or "lowness" of joints, entirely independent of the exercise of any judgment on the part of assigned observers.

In general, the track inspection car employed by the Erie resembles a railway business car, having an observation end affording ample space for the mechanical registering devices, as well as for the observers, officers and others who accompany the inspection trip. Officers' business cars are also included in the inspection train.

Variations in gage are recorded by means of two small wheels which trail the rear truck of the car. These wheels are mounted on the axle in such a way that the gage is adjustable, a coil spring pressing the flanges of the wheels against the rails under all conditions of gage. Normally these wheels rest on the rail but because of liability of damage while passing through facing point switches, crossing frogs, etc., provision has been made for lifting this pair of wheels clear of the rail by compressed air controlled by a valve in the car. The wheels are raised and lowered as directed by an electric bell signal under the control of a pilot riding in the locomotive.

Cross level of the track is recorded through the agency of a pendulum device mounted in the car. Low joints are recorded for each line of rail by the depression of the joints under the rear truck wheels. Specifically, the record shows how much the tread of the middle wheel of a six-wheel truck is depressed below a straight line connecting the treads of the forward and rear wheels.

A graphic record of gage, crosslevel and low joints is made by a recording instrument, which comprises a row of fountain pens which bear on a paper ribbon which slides under these fountain pens at the rate of 12 in. per mile of car travel. Thus under perfect conditions these pens draw straight lines on the paper, but with any deviations from perfect gage, surface or cross level the pens are deflected to one side or the other, the record in the case of gage and surface being made to one-half scale. The record made by the pendulum for cross

*Abstract of a paper presented before the Maintenance of Way Club of Chicago on January 20.

level is not to exact scale, but varies with the speed of the train, which, under ordinary operating conditions is run at the rate of 35 miles per hour. In case the cross surface of the track is irregular enough to cause the top of the car to sway quickly the lurch is recorded by a pen provided for that particular purpose.

Supplementing the graphic record made on the paper ribbon, an electrical contact device provides for the recording on direct reading counters of all low joints having a depression of 3/8 in. or more. A second set of counters records low joints of 5/8 in. or more. In addition to these counter or clock records, incandescent lights mounted on the operating stand light up whenever a low joint is encountered, thus making the registeration of the low joints more conspicuous.

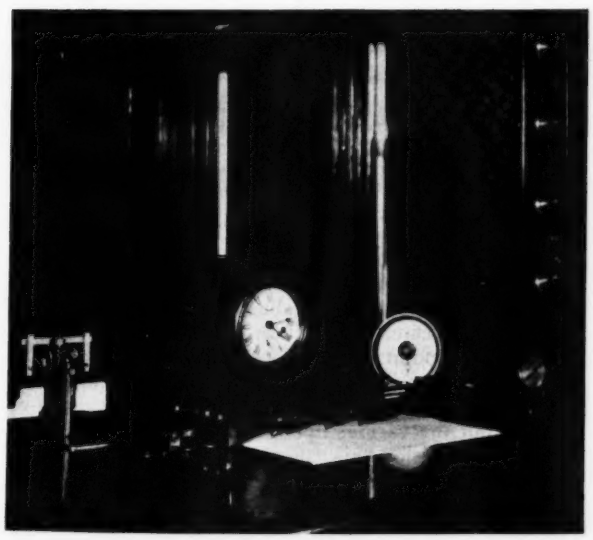
Affords a Personal Contact

Current maintenance of way work is so largely diversified and so widely scattered that to date no practical method has been found to check up and reward efficiency by following each individual operation of work as can be done in shops where all operations are under constant observation. To overcome this obstacle the maintenance of way department of the Erie has resorted to the system of annual track inspection and awards as a means of obtaining a close personal touch with the rank and file of that department and the physical condition of the road and the morale of its employees have been greatly improved by this means.

It is agreed that heavier rail, hard ballast, etc., have added to the better riding qualities of the track, but, in general, the annual betterments obtained during the working season and improved practices discovered and adopted have also added much to the better riding quality of the track. Without continuous care and proper drainage a railroad with the best of rail and ballast will soon develop rough riding track.

A survey of the benefits derived from the system of track inspection and prize awards in track work is presented below:

The inspecting officers, including the operating vice-presidents and those members of their staffs interested



A View of the Instrument Table Showing the Recording Pens and the Track Record Ribbon

in track work, are afforded the opportunity to meet the members of the maintenance of way department, the supervisors, general foremen and inspectors at a time when track work is the foremost consideration. Such meetings would otherwise occur but seldom. Their personal observation of the individuals, together with an actual inspection of the results produced by them opens the way for the selection and promotion of a better and more efficient staff.

Every well-meaning employee, and there are few who are not, is striving for the reward of merit. Necessarily the prizes are few. If a man is not lucky enough to be

Two Wheels Trailing the Rear Truck Record Variations in Gage

one of the winners, a good word from a superior officer or a remark relative to some outstanding feature of the track as the inspection train passes will bolster up his spirit for a year at least and let him know that his efforts have been appreciated. Consequently he will feel more like making a greater endeavor for betterment in the next season.

On account of limited space on the car it is impossible to have the section foremen accompany the track inspection party, but the spirit imbued in the supervisor by his superiors is transmitted to the foremen, who are, I believe, the most interested of all involved. The prestige gained by a section foreman in his community as a result of having won the track prize and the erection of the prize sign at his headquarters is worthy of consideration. This is especially so in small communities where many of the residents are employed as trackmen.

Very important is the increased efficiency obtained in carrying out work and the physical benefits derived by the railroad. The points considered on the Erie in the award of the prizes to supervisors and track foremen are such as to cover the entire year's work. Therefore, the award is made on a strictly impersonal basis. Substantial money prizes are given in form of first and second supervisors' awards on each of the three operating regions; first, second and grand prize section foremen's awards also are made on each of the operating divisions. In addition to the money prizes for section foremen, signs are erected at the foremen's headquarters and retained there during the year following the award, which is made during the late fall. Special money prizes are given to supervisors whose subdivisions are free from low joints.

The inspection is divided into two parts, the first pertaining to the taking of the record by the track inspection car, the second comprising the grading by a committee of such features as cannot be recorded mechanically. These cover line, ditching, policing,

fences, neat appearance of station grounds, etc. A further basis for the award is the actual money expended on ordinary maintenance during the entire year.

Advantages of Mechanical Records

The inspection pertaining to the registering done by the mechanical device cars is founded on the following considerations:

(a) The prime factor for a proper riding, high-speed track is correct gage, and the gage record is of importance in the prize awards. From the printed records of the chart, a winter program of gaging is made and irregularities checked and corrected. By this method it is found that where main track is not fully tie plated an annual average of from 15 to 20 per cent of the track mileage should be re-gaged and the rail canted. This is done largely during the winter. Without correct gage, track cannot be lined properly and equipment sways sidewise, causing bad riding conditions. With the knowledge that a detail record of gage conditions is bound to be taken annually, both supervisor and section foreman endeavor to obtain good ties and gage and, consequently, derailments from this source are reduced to a minimum.

(b) Cross surface or the relative elevation of one rail to another is recorded. Proper programming of work must be done to allow in advance for fall surfacing ahead of the track inspection and the cross surface must be kept as near right as possible the year round or it will be reflected by the widening of the gage. Cross surface conditions are greatly improved by an out-of-face program of surfacing with pneumatic tie tampers. Realizing this, competition for good tie tamper operation is strong among supervisors, a division average of from 10 to 11 miles per tamper per season of 24 weeks having been made.

(c) The elimination of low joints is a prime requirement for good riding track because of the unpleasant vibration of coaches resulting from a series of low joints in a train traveling at high speed. In order to be certain of the absence of low joints at inspection time, the foremen soon become educated in keeping them up during the entire year. If neglected very long the rails batter, angle bars become worn and bad conditions accumulate faster than they can be corrected immediately ahead of the inspection. The company is benefitted greatly through decreased expenditures for rail renewals where joints are kept tamped up solidly and bolts are tight as well as in its reputation for having a good riding track.

In 1908 when inspection records were first taken with the recorder, an average of 33 1/3 low joints was recorded per mile of main track; in 1921 the average was one low joint in 4 miles of main track; in 1923, one low joint in 14 miles; and in 1925 an average of one low joint in 77 miles of main track. The inspection of the Marion and Chicago divisions in 1925 registered an average of but one low joint in 246 miles of main track.

Other Factors Influencing the Awards

The following comments relate to the second part of the inspection by a committee viewing the roadway from the inspection train and to annual records maintained in the office of the division engineer:

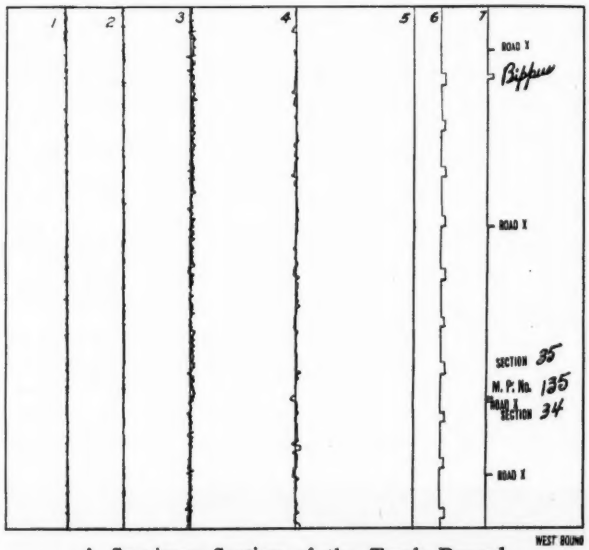
(a) General alinement, the condition of bridge approaches and the line through streets are considered. Not every foreman is a good liner and in the committee inspection general alinement is the main item considered. Without good line, a foreman has no chance of obtaining a prize. If his gage is not correct it is impossible for him to do proper lining. Track out of line is reflected also in the graphic record of cross surface in that it causes a side swaying of the car.

(b) Drainage imposes on the foreman the necessity for continual effort toward betterment, as good cross surface cannot be maintained on wet ballast or subgrade. A mechanical ditching machine is used for shaping ordinary standard side ditches but considerable hand work must be done afterward to afford proper outlets and to open up drainage crossing the right-of-way and beneath tracks.

(c) Policing is a habit instilled in the foremen to maintain a neat appearance of the section, to insure that emergency material is in proper location, ballast lines well trimmed, etc. A way must be found to continue this throughout the year and do it in a way that is most economical, as he needs all possible labor for work on the regular program.

(d) A neat appearance around tool houses, stations, etc., is important. Material must not be allowed to accumulate or it will be noticeable. With a lessened material balance the overhead expense of the railroad is reduced.

(e) The division engineer keeps a record of costs which enter into the final grading for track foremen and



A Specimen Section of the Track Record

Lines 1 and 2 show a record of surface on the two rails; Line 3 shows gage; Line 4, cross level; Line 5, lurches; Line 6, time (the interval between notches in the line is five seconds); Line 7, shows location (the notations along the side are stamped or written by the attendant)

supervisors. These pertain to the amount of and unit costs of rail laid, ballast and tie renewals, money expended on each section for ordinary maintenance and the cost of applying new ballast requiring extra gang labor. This creates competition for better and cheaper methods of handling the various operations.

The supervisor's rating is largely dependent upon the amount of work done and the efficiency obtained in carrying out the various operations during the year. On the Marion division this competition has resulted in an average performance in laying 100-lb. rail of 10.6 ft. of rail per man hour in 1924 and of 12.3 ft. of rail per man hour in 1925. These averages include all rail laid in turnouts, etc., all new rail being laid by bunching regular track gangs. In some specific locations as much as 31.7 lin. ft. of rail was laid per man hour of actual working time.

(f) Better automatic signal performance results from good track maintenance. Smooth joints mean good

insulated joints and a noticeable lessening of broken bootlegs and bonds and such troubles as add to overtime costs. All joints are tested with a straight edge and battered rails are welded or replaced.

(g) The bridge and building department must keep good line, surface and joint ties on bridges. Surplus material in that department must be cleaned up at all times.

Both signal and bridge and building departments cooperate with the track department for several weeks prior to the inspection and this leads to the settlement of any controversies concerning joint matters that might otherwise be passed from one department to the other without conclusion or proper results. Once a policy is determined and put into effect, quarrels regarding the question are avoided.

A system of track inspection and prize awards in track work benefits a railroad and its employees in that it affords a better way for the management to observe more closely and pick its best material for promotion. By friendly competition, a spirit is instilled in the members of the track department to out-do each other in their work and with the feeling that good work will in some way be rewarded. It is possible that without an annual track inspection and award of prizes much good work will be done, but an inspection creates the incentive for making the men think more than they would otherwise. The railroad obtains a general increase in the efficiency of labor and the supervisory organization and a betterment in physical conditions, compared with which the cost of the track inspection and prize awards is insignificant.

Operate Motor Cars Safely and Avoid Making Accident Report *

THE MOTOR CAR has come to be a very valuable tool in the hands of maintenance departments. There is every reason for believing that its use will continue to grow. Automobile competition is forcing the discontinuance of some local trains that were formerly used by the gangs getting to and from outlying jobs. In some quarters the scarcity of qualified foremen is necessitating handling the work in larger gangs which have to cover more territory.

However, this useful tool is not without its dangers, but in the hands of the supervisory forces is the ability to conquer or control these dangers. The use of these cars is under far better supervision than the automobiles on the highways. They can and must be made safe for the men, for others on the railroad and users of grade crossings. Probably every railroad using these cars has general rules covering their use. Paragraphs in the book rules and timecards give some definite rules as to signal protection and how running orders are to be handled. However, these general rules often omit the instruction of officers as to equipment and maintenance of the cars and many of the detailed rules that have much to do with their proper use.

Regarding the equipment of these cars the following brief rules should be considered:

Every car should be equipped with a safety railing extending all the way across the front. The space between the railing and the deck of the car should have some form of metal netting or a toe board to prevent tools from working forward and falling off.

On the roads where the motor cars must be used in severe weather a top should be provided. The windshield should be of wire plate glass or celluloid to prevent injury in case of breakage. The construction of this top should be such that there is no danger to the men from engine fumes.

For operation at night or in foggy weather lights should be provided, according to the standards of the road. Cars should also always be equipped with signal flags, fuses, and torpedoes.

Handles for lifting the car should be provided at both ends. In some cases it is well to provide a foot board on the rear to enable men pushing the car to jump on easily.

As with the automobile excessive speed is one cause of serious accidents. There are many cases where it would be advisable to equip the car with a governor to limit the speed to 25 or 30 miles per hour. Such a governor should be so installed that it can not be tampered with. Where possible, the motor car should be so arranged that its operator has plenty of room to work and so that all brake levers and controls are conveniently located. At the tool house or motor garage suitable equipment should be provided for the safe handling of gasoline and oils. Hoists and other tools necessary for repairs should be provided so that there will be no cause for injury in making these repairs.

A horn, bell, or whistle should be provided to give warnings at crossings and elsewhere along the track. With properly designed and equipped motor cars it is the duty of the supervisory forces to see that they are properly used.

The following rules will be a guide to safe operation. Frequent inspection under all conditions will be necessary to guarantee their observance.

Gasoline should never be handled in any but approved safety gasoline tanks. When filling gasoline tanks the nozzle must touch the tank to prevent ignition of the gasoline by static sparks. Gasoline tanks must not be filled while the engine is running. Employees having gasoline or kerosene on their clothes should keep away from open flames.

Smoking should be prohibited in the tool houses where the motor cars are kept and around the cars during repairs. Open flames should not be permitted in the same room with the cars. All necessary artificial illumination should be obtained with a drop light or flash light.

Unnecessary exhaust fumes should not be created in the tool house where motor cars are stored, and tool house doors must be kept wide open when the motor is running.

To start free-running motors the operator should give the engine a quarter-turn by lifting up on the crank with fingers and thumb on the same side of the handle, standing as far back as possible. The motor should not be spun nor the crank handle moved by downward pressure.

No motor car should be operated unless it is mechanically safe to operate and then only by a man familiar with its operation. An inspection should be made and all defects corrected before starting out. The bolts fastening all moving parts must be tight. The foreman with the car or its operator should have with him a copy of the current timetable.

Cars should be equipped at all times with proper signal flags, fuses, torpedoes and lanterns. As with automobiles, a tool box should be equipped with such small tools as are necessary to make minor adjustments away from the shop. A small first aid kit should be provided.

The foreman should see that the men are loaded on the car symmetrically and that all the tools are secure against falling off. The operator should be given plenty of room to handle the controls and brake. Others should not interfere with him.

Men should be prohibited from getting on or off the moving car from the front or sides. Two men are enough to push the direct-connected type of motor car. They should be assigned the back seats and should board from the rear.

Certain men should be appointed by the foreman to ride in designated places, one to look forward and another back for approaching trains, open switches and other obstructions.

In lifting the car on and off the track the foremen should assign each man to a regular place so there will be no con-

*Abstracted from a report on the reduction of accidents to employes, presented before the convention of the American Railway Bridge and Building Association at Buffalo, N. Y., on October 20 to 23.

fusion. The men should be taught to work in unison as handling the car must often be done quickly and in awkward places.

The speed of the car should generally be limited to freight train speed. The motor cars should approach all interlocking plants and grade crossings prepared to stop. A proper signal with a whistle, horn or bell must be given when approaching highway grade crossings and gangs of men at work along the tracks. Eight miles an hour should be the limiting speed over crossings and switches.

Proper signal flags or lights should be displayed according to the rules. When torpedoes are run over they should be replaced before proceeding. Motor cars should not be operated on main tracks without permission of the operator. Where communication with the operator is not available the car should be operated with extreme caution under flagging protection until a point of communication is reached. It should be remembered that a train is due on any track in either direction at any time.

Conveniently located setoffs should be provided for the motor cars. When not in use, motor cars must be kept locked and so secured that they cannot be moved so as to endanger the safety of trains.

None but employees in the discharge of their duties should be carried without official order.

How the "Gun-crete" Was Applied

Decreasing The Fire Hazard Of A Wooden Shop Building

AN EXAMPLE of inexpensive conservation of a wooden building was recently carried out on a car repair house belonging to the Elgin, Joliet & Eastern at Joliet, Ill. This building was put up in 1909. It is 300 ft. long by 87 ft. wide, with a longitudinal partition through the center. The construction is entirely of wood, consisting of posts, studding, girts and rafters. The roof is tar and gravel. The sides and ends of the building are covered with drop siding inside and outside and the longitudinal partition covered on one side only with drop siding. The side posts are 19 ft. high and the center posts 23 ft.

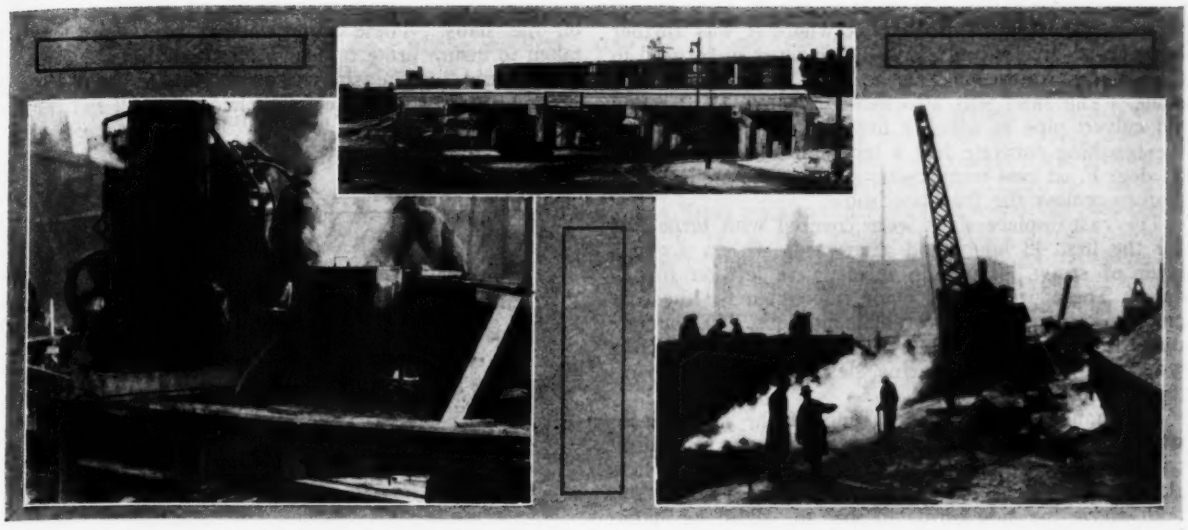
A Side View of the Wooden Car Repair Shop in Its Original Condition

As this building is surrounded by other buildings of fire resisting construction, it was desired to make this building fireproof insofar as external hazard was concerned. To have replaced this building with an all-steel building would have been quite expensive, besides interrupting the service of the building. It was decided that the fireproofing could be sufficiently well attained by covering the entire wall surface, excepting doors and windows, with a coating of ¾ in. reinforced cement mortar applied on the walls with cement guns.

All weather-boarded surfaces, on both the inside and outside of the exterior walls, and on both sides of the weather-boarding on the partition wall were covered with American Steel & Wire Company's No. 2-L galvanized triangular mesh. This was securely nailed, using furring posts so as to remove the wire mesh about ⅜ in. away from the boards.

"Gun-crete" consisting of one part of Universal Portland cement and three parts of clean sand was then shot through the wire mesh against the weather-boards with cement guns, using a pressure of about 60 lb. at the gun. The appearance of the building before and after this operation is shown in the illustrations. The contractor on the job was the Cement-Gun Construction Company, Chicago, to whom we are indebted for the above data and information.

Appearance of the Building After It Had Been Coated With Cement Mortar. The Covers Placed Over the Windows While the Work Was in Progress Were Still in Place



Heating the Water and the Aggregates Was an Important Fac tor in the Success of the Work

Use Modern Concrete Methods On Large Subway Project

Winter Work Hastened Completion of Grade Separation Project at Chicago. Water-Cement Ratio Employed in Determining Proportions

By C. R. St. CLAIR
Engineer Track Elevation, Pennsylvania System, Chicago

AS PART OF Chicago's plan of extending Ogden avenue northeast from Union park to Lincoln park, the Pennsylvania and the Chicago, Milwaukee & St. Paul were required to elevate the tracks which they own jointly at the intersection of this street extension. By agreement the work was handled by the Pennsylvania.

This project comprises an extension of a progressive track elevation plan which the Pennsylvania has pursued during the past 20 years on its "Panhandle" route through the city from Seventy-fifth street to Ashland avenue, with the exception of the section from Fifty-first street to Forty-third street. The work just completed extends the separation of grades east from Ashland avenue to Ogden avenue, with the run-off terminating at May street, a distance of 1,700 ft. to the east. In addition to rebuilding the four main tracks over this distance, the storage and the team tracks of the Pennsylvania had to be re-arranged for a distance of 3,000 ft. The chief feature, however, is a handsome reinforced concrete subway crossing over Ogden avenue. It consists of five spans of concrete slabs on two abutments and four lines of reinforced concrete bents, as shown in the drawing and photographs. The tracks cross Ogden avenue at an angle of approximately 63 deg.

Build Structure for Ultimate Requirements

It was originally planned to build abutments and columns for the ultimate track development but to provide a superstructure at this time of only sufficient width to accommodate the four tracks now used. This would have made a rough, unfinished structure and after further consideration it was decided to build the whole subway at once, which resulted in a structure in keeping with the other developments on the boulevard.

It was necessary to keep rail traffic moving during the construction of the subway and to interfere as little as possible with street traffic. Most of the Pennsylvania passenger traffic enters Chicago over its "Fort Wayne" route, but the heavy passenger service of the St. Paul had to be accommodated without delay.

Space permitted building two standard pile trestles on the south side of the existing main tracks and after two of the main tracks had been transferred to these trestles two similar trestles were built on the old location of these two tracks. When these trestles were finished, the two remaining main tracks were placed on them.

The temporary trestles and concrete footings were built in the fall of 1923 and spring of 1924, while the concrete abutments and columns were built in the fall of 1924. This made it possible to release one of the temporary trestles. Because of the availability of this timber for shoring, it was found most economical to cast 30 of the standard slabs in place. These are approximately 30 ft. long, 6½ ft. wide and 3½ ft. thick.

Continue Concrete Work Through the Winter

The casting of the 30 cast-in-place slabs and of the first set of 12 pre-cast slabs furnishes an excellent illustration of winter concrete work. Whenever the temperature was 40 deg. F. or below during the day, the mixing water and sand were heated so that the temperature of the concrete in the forms immediately after placing was 55 deg. to 60 deg.

To accomplish this the mixing water was passed through a heated coil to a tank where it was further heated with live steam. Live steam pipes were used to thaw and warm the sand and to drive the frost from the stone. The sand was also heated by piling it around old culvert pipe in which a fire was kept burning. As the resulting concrete had a temperature of 55 deg. to 60 deg. F., it was unnecessary to heat the stone, other than to remove the frost and snow.

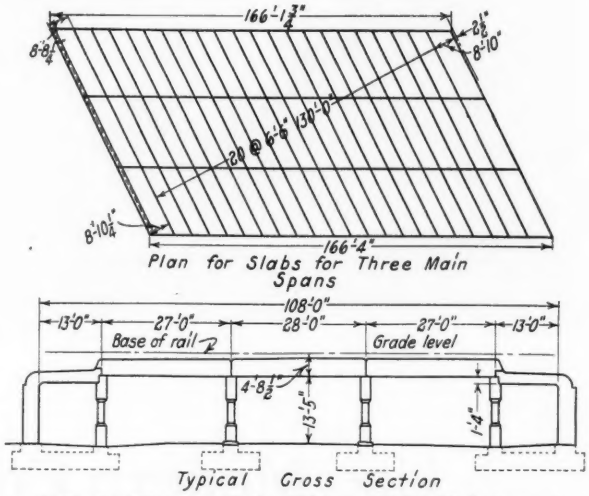
The cast-in-place slabs were covered with tarpaulins for the first 48 hours and afterwards with a six-inch layer of straw. The side forms were left on for 10 days. These precautions made it possible for the concrete to harden under favorable conditions. The concrete under the straw was noticeably warm to the touch a week or 10 days after placing, despite the low temperature outside.

Simultaneously with the casting of the last cast-in-place slabs, forms were built between sidings adjacent to the bridge site for 12 of the pre-cast slabs. As these slabs were to be cast in early January a roof frame was built above the side forms so that the slabs, when finished, could be completely housed and kept warm with salamanders for a week. After this the closed forms themselves furnished adequate protection. By means of this winter concrete work the 30 cast-in-place and 12 pre-cast slabs or nearly two-thirds of the slabs were ready for service six months sooner than would have been the case if the old time plan of discontinuing work in winter had been followed.

How the Slabs Were Erected

The placing of the pre-cast slabs formed an interesting feature of the work. The slabs, weighing approximately 50 tons each, were loaded on flat cars by wrecking derricks and transported to the bridge site where they were unloaded by the wreckers and set in place. The flat car was placed between the two wreckers and each slab lifted by means of lifting hooks cast in the concrete.

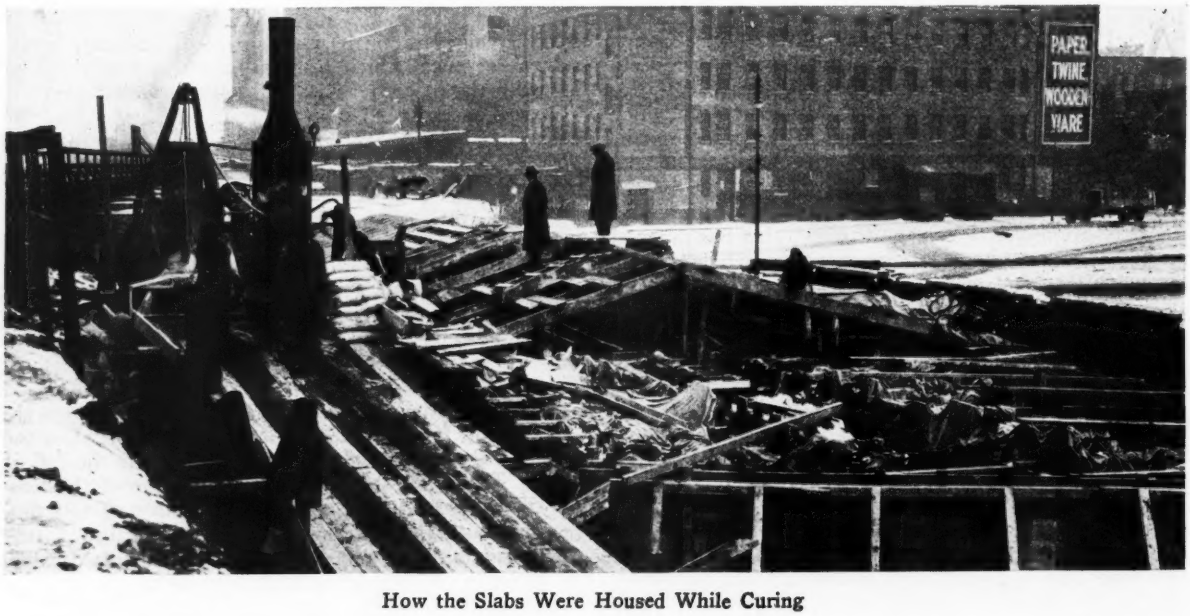
After the slabs had been placed they were covered with a two-ply cotton fabric membrane with an asphalt filler. The backs of the abutments were similarly covered. A two-inch layer of 1:3 cement mortar, reinforced with a wire mesh was placed over this coating on the slabs. These waterproofing precautions were taken to insure protection to traffic underneath. Ballast was placed on the slabs four days after the waterproofing was applied, the tracks laid, and full rail traffic carried at the end of a week. Only two days were required to load and place a set of 12 slabs.



A Typical Section of the Bridge and the Slab Layout

After the first 12 pre-cast slabs were placed, two additional sets were made in the same forms. To eliminate hair cracking and to insure development of full strength the slabs were kept wet for 10 days.

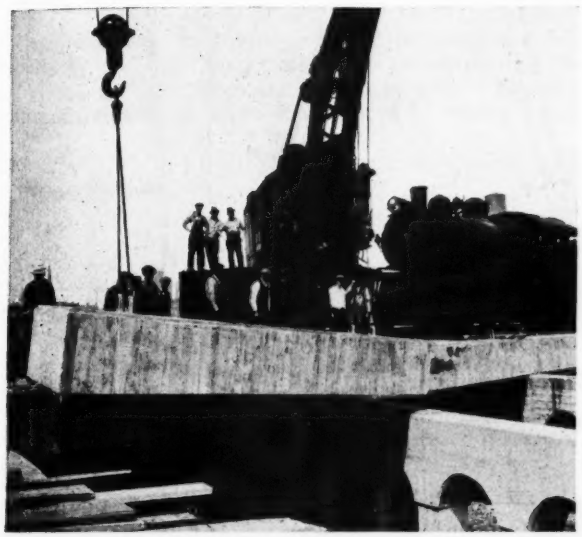
The concrete in the last 12 slabs was designed by the water-cement ratio method for a minimum compressive strength of 2500 lb. per sq. in. This strength was selected, as it was the judgment of the engineer in charge that concrete of this compressive strength would be at least equal and possibly superior to that resulting from the arbitrary proportions, 1-2-4, required by the specifications governing the work. The quantity of cement per cubic yard of finished concrete was about the same for a compressive strength of 2500 lb. per sq. in. as was



How the Slabs Were Housed While Curing

being used under the arbitrary proportions. The contractor willingly consented to the adoption of a method that was being used increasingly because of the excellent quality of the resulting concrete and the economy secured.

No additional field equipment was used in applying the water-cement ratio method, although the work would have been simplified if the mixer had been equipped with an automatic water control device and the aggregates measured more accurately than was practicable with wheelbarrows. As it was, the water tank on the mixer was calibrated and an employee of the railroad assigned the duty of filling the tank with just enough water to give the proper water-cement ratio with the quantity of cement per batch necessary for the compressive strength desired. Proper allowance was made for the water already in the aggregate. With reasonable care in loading the



How the Bridge Slabs Were Set in Place

wheelbarrows to the marked capacity, concrete of uniform workability was secured. Slump tests were taken at intervals during the day. With the quantity of cement and mixing water constant and accurately measured, an increase in slump above that for which the mix was designed (6 to 7 in.) indicated that the full quantity of aggregate was not being used and was accompanied by a loss in yield. Steps were then taken to increase the quantity of aggregate until the desired workability was secured.

The Field Laboratory

To determine the moisture content of the aggregate and the economic proportions of fine and coarse aggregate, a small field laboratory was set up in one end of the field office which occupied an old box car. The total cost of this equipment did not exceed $40 and consisted of the following:

One pair of scales with a capacity of 35 lb. and weighing to 1/16 oz.
Three square mesh riddles 18 in. in diameter, for the coarse aggregate, these riddles having meshes of 1½ in., ¾ in. and ⅜ in., respectively.
Three standard square mesh sieves for the fine aggregate, the meshes being No. 4, No. 16 and No. 50.
A 1/5 cu. ft. metal measure.
A slump cone and rod.

With this equipment the simple tests necessary to design the concrete mixture were made. Trial mixes were first made to determine whether the computed proportions gave concrete of the desired workability and test cylinders made as a check on the compressive strength. Test cylinders were also made from each 25 cu. yd. of concrete. These cylinders were kept in the box car field laboratory for 48 hours and then placed in moist storage until they were broken at 28 days. The results of these tests gave an average of 3,574 lb. per sq. in., which was about 500 lb. higher than was expected. Only one of the 12 cylinders made showed a strength lower than the expected minimum of 2,500 lb., viz., 2,210 lb. In the light of these tests the mix was conservatively designed and if the work were being continued, a marked saving in cement could have been made and the desired strength obtained. The uniform workability of the concrete made by this method helped considerably in placing concrete in the forms.

The work was done under the supervision of Robert Trimble, assistant chief engineer of the Pennsylvania. The total cost was $425.000. The Ben Neuendorf Company, Chicago, was the contractor.

The Cure of Lumpy Track*

By G. T. Anderson
General Roadmaster, Kansas City Southern, Texarkana, Tex.

LUMPY TRACK is caused by several things. Surfacing track without the use of grade stakes, pulling the track to high points with a spot board is one cause. Experience has taught me that while many foremen may do a fairly good job of surfacing track by pulling the track up to spot boards without the use of grade stakes, track should not be surfaced in long stretches without the use of grade stakes set by engineers, to insure a uniform grade line.

In many cases lumpy track is caused by improper workmanship when putting in ties and smoothing up track. Rough spots will develop where ties have been put in improperly. All ties should be properly distributed throughout the rail to give an equal bearing; if this is not done, it will result in a track depression on account of the wide spacing of ties and where new ties are put in, if they are not properly tamped up and spiked low spots and churning ties will result.

The best plan to follow in putting in ties where track is not being surfaced is to dig out the old ties. Do not use a jack for springing up the rail—nip them up to the rail and tamp the tie throughout its entire length with shovels where using gravel or chat ballast, then spring the rail up sufficiently to put on tie plates. As the roadbed is usually cut down from one to two inches deeper than the thickness of the new tie, with the tie plate we are now using there will be sufficient depression in the ballast to settle the new tie to the general level of the others without leaving the track lumpy. Another way is to lift up the tie, full-spike it and tamp with a tamping bar through the entire length of the tie.

Spotting up track without the use of the level board and without proper spacing of ties will cause irregular surface with the track running high on one side and reversing to the opposite side. While it will look very good, provided it is in good line, it will at the same time ride rough on account of these high and low spots.

Lumpy track is also caused by improper tamping of ties when surfacing, due to a portion of the ties being properly tamped while others are not, causing a portion of the track to settle while other portions remain firm. Such conditions can be corrected by proper supervision by the foreman, who should see that his gang is properly instructed and the tamping done uniformly,

*A paper presented at a meeting of the Kansas City Southern Maintenance of Way Association at Shreveport, La.

Rail movement will cause lumpy track. The amount of this track depression is dependent upon the condition of the subgrade and the general track conditions as to ballast, ties, rail and weight of the rolling stock. Any weakness in the drainage, ballast, ties or rail will at once show up, if not corrected, and if not taken care of will increase and cause uneven surface. If water is permitted to lodge under ties, it will cause them to churn and prove destructive to the track structure.

Movement or vibration of any kind in the track is objectionable and when rail movement occurs it usually presses the ties into the ballast, causes them to churn, displaces the ballast, especially at joints, and causes the joints to settle, injuring the roadbed and rail, wearing the angle bars and bolts, raising up the spikes, cutting ties and spikes and causing the rail to creep.

Expanding and contracting rail results in joints and centers becoming low and rail quarters high, the weak point being at the joint; one will notice wheel shocks on one side and then on the opposite rail also. From this line of reasoning it follows that when a rail is low at one point, it must be high at another, which is usually the quarter.

Rail movement and loose track bolts prove rather destructive to rail joints. There are several parts which work independent of the others—angle bars, bolts, nut locks and to a certain extent, spikes—and continued rail motion or vibration destroys the mutual relationship between these parts, resulting in material wear. Therefore, to correct or eliminate this wear, each foreman should endeavor—which is not unreasonable—to keep his track bolts tightened up well.

Specifications for Portable Ladders

THE REPORT of the Committee on the Reduction of Accidents to Employees, presented at the convention of the American Railway Bridge and Building Association at Buffalo, N. Y., on October 22, included the following specifications for portable ladders which were offered as representing safe practice:

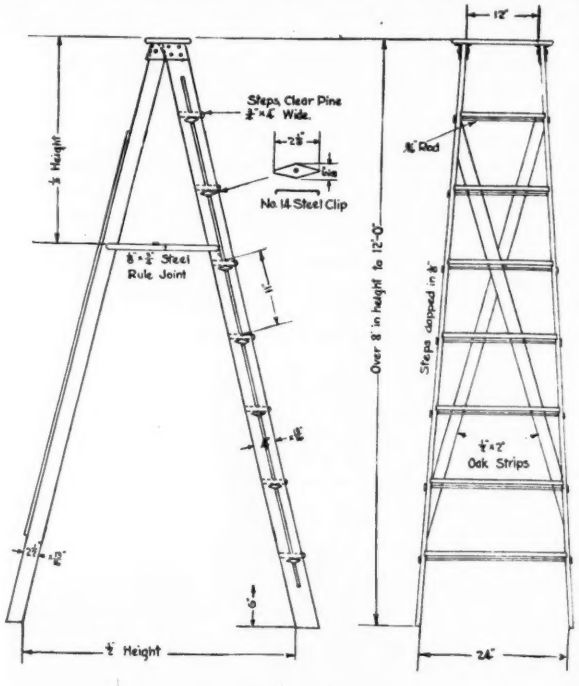
Specifications. The side rails shall be made of straight grained spruce or oak, free from knots, shakes or rot, finished smooth and free from slivers, corners rounded. Steel may be substituted when desirable. The rungs shall be of straight grained hickory or white oak, free from knots, shakes or rot. Steel may be substituted when desirable, rungs to be welded. All metal guides, hinges, hooks, spurs and clips used in the construction of ladders shall be well shaped and forged and made from soft steel, all bolts to be the exact length and size required and all nails to be galvanized. All ladders must be fitted with a non-slip device, the type used to be determined by the location where used. They should be finished natural and oiled.

Inspections. Foremen shall make frequent inspections and take ladders out of service that are found defective. Any employee whose duties require him to use ladders for any purpose should see that the one he is about to use is in a safe condition and if not, report it to the foreman for repairs.

Common Type Ladders. The side rails shall be 1⅝ in. by 2½ in. at the top and 1⅝ by 3 in. at the bottom, spaced 15 in. apart inside at the top and 20 in. at the bottom in a length of 20 ft., the same spacing to be maintained at the top of all ladders of this kind and tapered the same in proportion to their length. The rungs shall be round, 1⅜ in. in diam. at the center and 1 in. at the ends, spaced 12 in. apart and doweled into the side rails 1 in. deep, nailed vertically through the side rails, with tie rods ⅜ in. diameter for each 6 ft.

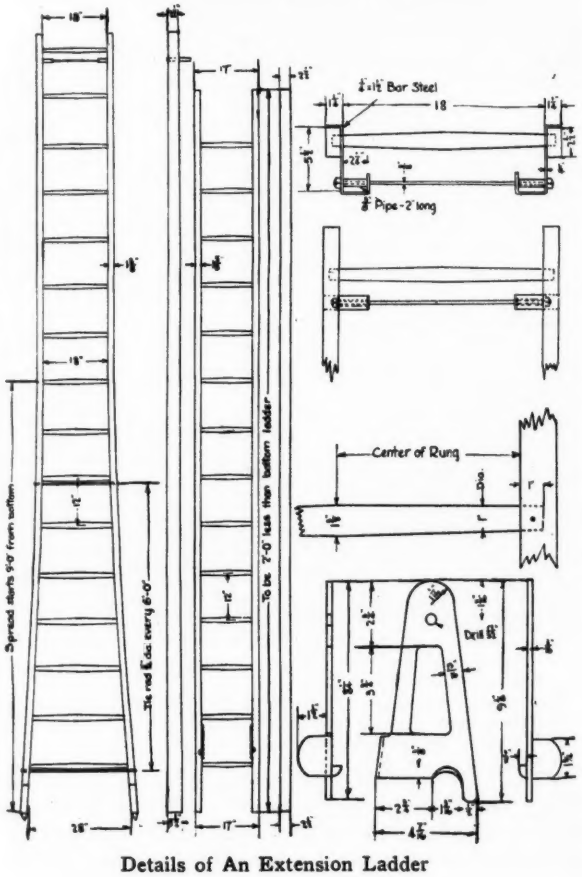
Extension Ladders. The side rails of the lower section shall be 1⅝ in. by 2½ in. at the top and 1⅝ in. by 3½ in. at the bottom, spaced 18 in. apart inside at the top and 28 in. at the bottom, the spread to begin 9 ft. from the bottom, fitted with ¼ in. by 1½ in. guides at the top for the sliding section. The side rails of the sliding or upper section shall be 1⅝ in. by 2½ in. at both top and bottom and spaced 17 in. apart outside at both ends, fitted and with rung hooks.

It is recommended that all extension ladders be made to have an over-all length, when fully extended, of 30 ft., the bottom sections being 18 ft. long, the top section 16 ft. long and the



NOTE:
Ladders under 8 feet, Side rails ⅝"×3½" not split. Shifts ⅝"×2".

Recommended Design for a Step Ladder



Details of An Extension Ladder

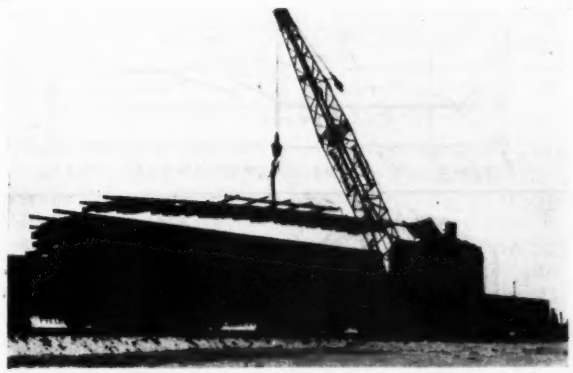
two sections overlapping 4 ft. The rungs shall be round, 1⅜ in. in diam. at the center and 1 in. at the ends, spaced 12 in. apart and doweled into the side rails 1 in. deep, nailed vertically through the side rails, with 3 tie rods, ⅜ in. diam.

Step Ladders. The side rails shall be straight ⅞ in. by 4 in. spaced 12 in. apart at the top and 24 in. at the bottom, in a height of 12 ft. For all ladders 8 ft. and less, side rails shall be ⅞ in. by 3½ in., and tapered the same in proportion to their length, a slit to be made in the side rails extending to within 6 in. of each end, and rails spread at the center ⅛ in. to one ft. of the length of the ladder 12 ft. high, on shorter lengths not slitted. The steps shall be ¾ in. by 4 in. wide, dapped into the rails ⅛ in. and nailed with galvanized box nails from the outside face with a ⅜ in. rod underneath passing through to outside of rails and riveted over a strap washer clipped around the edges of rails, the rise to be 11 in., the stilts to be ⅞ in. by 2½in. on ladders of 8 ft. or more and ¾ in. by 2 in. on ladders under 8 ft., hinged to side rails and fitted with a rule joint spreader 1/3 of the distance from the top, and sway braced with ½ in. by 2 in. oak strips. The spread should be one-half the height.

How A Track Was Moved 500 Miles

By GEORGE E. OLSON
Northwest Representative, the P. & M. Co., Chicago

IN AN EFFORT to complete an extension of the Bainville branch of the Great Northern from Scobey, Mont., north 20 miles to Peerless in time to bring out the wheat grown in that territory last fall, a novel and interesting expedient was adopted for the laying of the track in the minimum time. The material for this extension was secured by taking up an



Lifting a Section of Track from the Cars, Showing the Method of Loading for Shipment

abandoned branch line on the Mesaba range north of Duluth, Minn.

This track consisted of 80-lb. rail, full tie plated. It was disconnected at every second joint and was handled in units of two panels or 60 ft. lengths. Part of the line taken up was laid with broken joints and before loading it one row of spikes was pulled and the rails driven back until the joints were even. The panels were then loaded on flat cars, complete with ties, fastenings and rails, being picked up and placed on the cars by a 35-ton locomotive crane with a 50-ft. boom. The panels were loaded 10 high, making 600 ft. of track in each load. The material was moved to its destination in regular trains without special train service.

On arrival in Montana the cars were taken out to the end of track by a large oil-burning Industrial locomotive crane which was constructed for a traveling speed of 15 miles per hour, a 10,000-lb. drawbar pull and 35-ton lifting capacity. This crane proceeded to the front each morning with a sufficient number of panels of track on cars behind it to keep it busy during the day. On arrival at the end of track the panels were picked up from the cars immediately behind the crane, one at a time by means of a spacer arrangement, swung around in front of the crane and laid on the grade. To avoid delay short straps were used to connect the joints ahead of the crane, standard angle bars being applied after the crane had passed over.

As each panel was laid, the crane, with two cars behind it, would move ahead on the newly-laid rail until the last panel had been unloaded. The flat cars were then picked up by the crane and set off along the side of the track, this being done by hooking four chains into the arch bars of the truck and lifting the cars in this manner. This expedient was found to be satisfactory when the crane was working more than 1200 ft. from a switch as the time required to lift a car off the track did not exceed four minutes and the side tracks were located at seven mile intervals. At the close of the day the crane picked up and re-railed these cars on its way back to headquarters, requiring from six to eight minutes to re-rail a car. A total of 350 cars were handled by the crane in this manner.

In spite of inclement weather, with rain which made the new grade very soft and later froze up, from one-half mile to three-quarters of a mile of track was laid per day. During the progress of the work the temperature went down to zero on several occasions with strong winds blowing, which made conditions very unfavorable. In spite of this fact, from one-half a

Placing a Section of the Track Ahead of the Crane

mile to three-quarters of a mile of track was laid per day, with a force of from 20 to 30 men, most of whom were employed behind the crane, putting on angle bars, spacing ties and lining track.

In addition to the rapidity with which this line was laid, and the marked saving in labor that was effected, there was also a marked saving in track materials. Many ties were picked up with each panel which would have been left on the old grade if the track had been dismantled, while there was practically no loss of fittings such as bolts, spikes, tie plates or rail anchors.

An important feature contributing to the success of this plan was the availability of locomotive cranes of

sufficient capacity to handle a section of track weighing from five to six tons at a 50-ft. radius without clamps or outriggers. In laying this track the crane was kept out of the prairie during the entire job with no other attention or repairs than the operator could give it and it completed the entire work without any delay. The first four miles of this line was laid with-

Placing a Car on the Shoulder of the Embankment to Avoid Returning It to a Siding

out the use of a locomotive and it would have been possible to have completed the entire job without one if it had not been for heavy grades.

This work was handled under the personal supervision of George D. Smart, general roadmaster on the Eastern lines of the Great Northern.

How Hydraulic Rams Cut The Cost of Water

By L. H. Robinson

Division Engineer, Canadian National, Campbellton, N. B.

MARKED reductions in the cost of supplying locomotive water on the Bridgewater division of the Canadian National have been effected by the substitution of hydraulic rams for a number of pumping plants and through the entire elimination of two other water stations. The manner in which this was accomplished was described in an article by the writer in *Railway Engineering and Maintenance* for June, 1923, page 239. Since that time one additional ram has been installed on a branch line and more complete cost records of performance have become available, demonstrating the economies which have been secured as a result of this change in water supply equipment. For this reason a brief review of the results obtained is given below:

The Bridgewater division of the Canadian National is in Nova Scotia and consists of 372 miles of line, of which 246 miles comprises the main line between Halifax and Yarmouth. Originally the water stations were of the following characteristics:

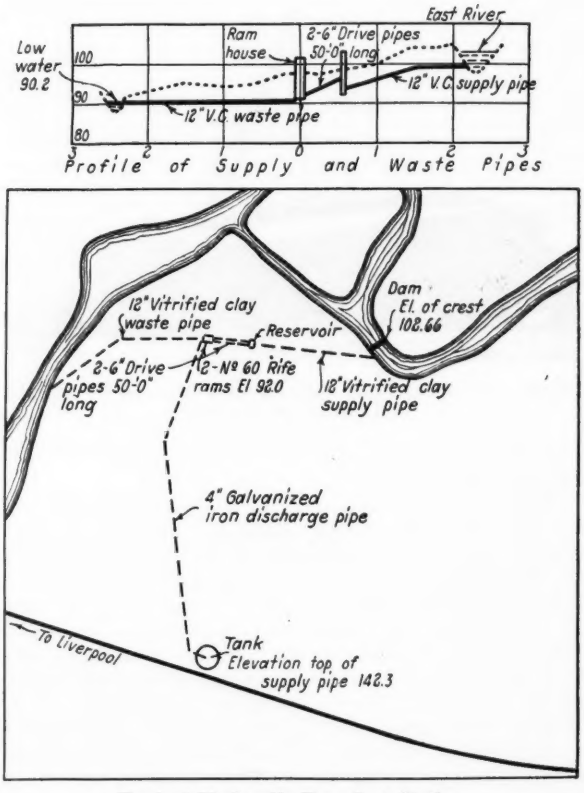
Stations where supply was obtained from municipal water works	5
Stations having gravity supplies	5
Station equipped with hydraulic rams	1
Stations having gasoline driven pumping plants	11
Total	22

The major portion of the cost of operating these plants was due to pumping service, including the wages of pumpmen, pump repairers and extra compensation to section men for keeping fires in tanks during cold winter weather. The cost of gasoline, oil and the coal for heating tanks was also an important item.

Two of the stations equipped with pumping plants were eliminated and all of the others were provided with hydraulic rams except one, which was equipped with an automatic electric pump. The present status of the water facilities is therefore as follows:

Plants taking water from municipal supplies	5
Plants having gravity supplies	5
Plant operated by an automatic electric pump	1
Plants equipped with hydraulic rams	9
Total	20

These changes have eliminated all labor charges for attendants at water stations. The position of pump repairer has been abolished and arrangements were made with the electrical and signal departments to provide whatever care is necessary for the automatic electric pump. The ram installations require no fires in the tanks in freezing weather, as the rams operate continuously, the tanks overflowing when full. While the number of



Typical Hydraulic Ram Installation

water stations has been reduced the interval between tanks was made more uniform and the maximum interval lowered. It is reported that the hydraulic rams have proved entirely satisfactory. The following is a comparison of the operating costs before and after the installation of the hydraulic rams on the Bridgewater division.

Annual cost of water service in 1920	$23,439.20
Annual cost of water service in 1921	21,551.23
Average annual cost for the two years	22,495.21
Annual cost of water service in 1924	5,047.38
Net annual reduction in operating expenses	17,447.83

The cost of installing automatic service on the Bridgewater division was $35,469.97.

How The Southern Pacific Protects Timber Bridges From Fire

Description of the Practices Developed to Reduce the Danger of Loss of Structures

By H. POLLARD

Superintendent Fire Protection, Southern Pacific, San Francisco, Cal.

THE SOUTHERN PACIFIC has in service about 130 miles of wooden trestles of open and ballast deck types and constructed of both treated and untreated timber. These trestles are located in a wide variety of territories ranging from the desert to the dense underbrush and heavy timber countries, with the hot and dry climate on the desert and the wet and cold climate during the winter in the timber and mountainous country. On all parts of the system, however, hot weather prevails during the summer and the hot, dry season is of long duration, a period of over 100 days without rain not being looked on as unusual. These long, hot, dry summers greatly increase the hazard of fire.

Protection from Ground Fires

The protection against fires on trestles is of two classes, protecting the structure from the ground and from the top. Each has fire hazards peculiar to itself.

Much of the territory in which the railroad runs is covered with dense vegetation during the growing months, which vegetation dries during the hot weather. Underbrush and trees are also fire hazards which must be dispensed with.

Protection against fires of this character is afforded by our fire rule No. 4 which reads as follows:

"Grass and weeds must be cut or burned at the proper time, and the right-of-way kept clear of trees and brush and bushes. Rubbish and waste that cannot be burned must be buried. Under no circumstances must any fire be left burning after working hours, unattended.

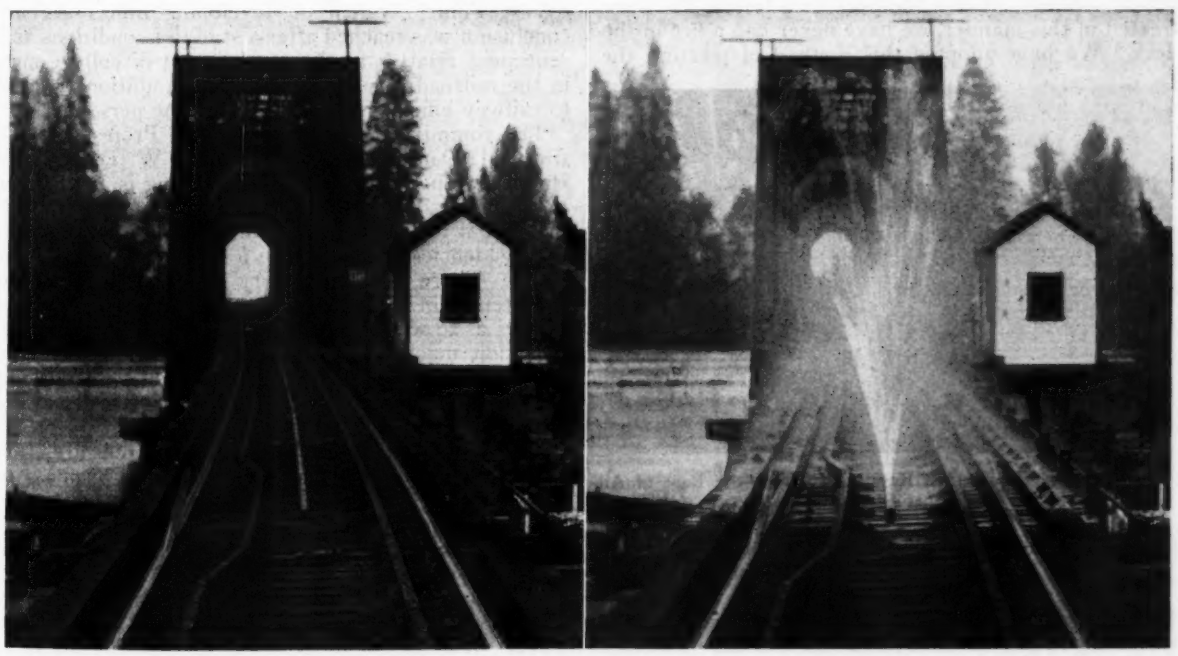
"Grass and weeds should be cut away from all structures for a distance of 30 ft. and extending back on embankments a distance of 50 ft. (at each end) and the ground kept clean. Brush and weeds are to be cut to the right-of-way line and burned for the length of all structures."

With the ground cleared as required by this rule we believe that adequate precautions have been taken to prevent fires from starting beneath our trestles for the possibility of fire starting from sparks falling from the top has been removed, as has been the danger of fire spreading outside of the right-of-way.

Where buildings are located close to our trestles and water is available the structures are protected by means of a pipe placed in the center of the track with holes bored in it to permit the spraying of water over the trestle. These holes are drilled at different angles to allow the water to strike the trestle at many points. This same system is used where dense timber stands close to wooden bridges.

Protection from the Top

The protection of trestles from the top is a different problem for we encounter many more fire hazards from the top than from the bottom. The most important fire hazard that the open deck trestle is exposed to comes from the locomotive. Both coal and oil burning locomotives operate on the Southern Pacific, although the fact that most of them burn oil reduces



Perforated Pipes Are Laid on the Decks of Many Structures. Photograph at Right Shows Pipe in Action

the fire hazard. To some extent oil burning locomotives also create a fire hazard, for in some cases oil accumulates in the fire boxes and catches fire owing to the burner or atomizer not working properly. Precautions to be adopted against such fires are, however, the same as with coal burning locomotives.

The most effective protection for a trestle is a ballast deck. To protect open deck trestles from fire dropping from the fire boxes of coal burning engines we convert our open deck trestles into imitation ballast decks by placing strips of wood between the ties and then covering the floor thus formed with a thin coating of gravel, crushed rock or slag.

Other common fire hazards which we endeavor to guard against are sparks or red-hot splinters from brake shoes and burning tobacco thrown from trains or by people walking on the trestles. Fusees thrown from the rear of trains during the night and burning embers flying from burning property adjacent to our right-of-way also lead to fires. We have adopted several methods to reduce fire hazards of this kind which are as follows:

1. Water barrels and buckets are maintained on trestles 75 ft. or more in length at intervals of 75 ft. We have knowledge of cases where a water barrel and a bucket played a very important part in the hands of non-employees in extinguishing trestle fires.

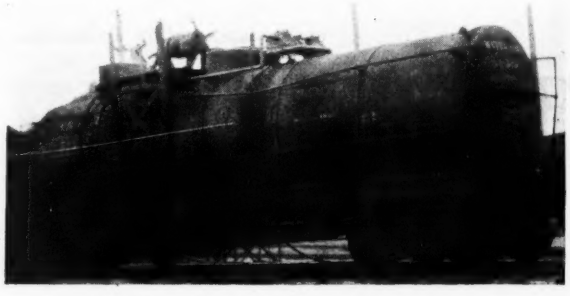
2. On mountain grades where brakes are used continuously fire starts not infrequently in the tops of ties and stringers from sparks and hot pieces of metal from brake shoes. To overcome this hazard we have painted the ties and exposed sides of the stringers with paint, giving the timber all the paint it will hold without running. Paint is applied with a spray, in preference to a brush, because the paint is forced into the rough surface of the wood better than can be accomplished by the use of a brush. We have been using the box car red paint for this purpose, although experiments are now being made with several fire resistive paints that are on the market. While the paint is still wet, sand is applied, allowing the paint to absorb all it will hold. When this treatment dries, a hard crust is formed over the surface of the timber where applied. Where the deck of a trestle has been treated in this manner, we have never had a fire in the deck. We have adopted this method of treating the

Vegetation and Brush Are Kept Away from the Base of All Timber Structures

tops of structures on long trestles on the San Joaquin Valley lines on which trains stop frequently.

In territories where we have long, high trestles, we have equipped the tender of the locomotive with a sprinkling system so that the trestle top can be wetted as the locomotive passes over it. The system consists of a pipe in which many holes have been drilled, and which is attached to the bottom of the water tank on the tender, with a control valve located in the engine cab so that the engineer can open the valve when crossing a trestle and close it when he leaves the structure.

In heavily timbered country where burning embers from forest fires may fall on a trestle, we have provided a water pipe line equipped with a hose so that,



A Tank Car Ready for Action

when necessary, the timber can be saturated with water.

Another valuable fire prevention aid is the water car. This is a tank car equipped with a pump, with sufficient hose to answer all reasonable requirements, and necessary tools to make it a complete fire-fighting tool. The pump is operated by steam from the locomotive. This car is stationed on a track where it is first out at all times, and is kept in condition for immediate use.

Railroads Not Looking For College Graduates

ACCORDING to a preliminary report made by a committee appointed by Yale University the railway managements are not in favor of the "West Point" system of developing officers. This conclusion was reached after a study of conditions and sentiment relative to the employment of college men in the railroad service and of other conditions related to railway efficiency, as affected by the personnel.

The committee in charge included Professor Winthrop M. Daniels, Professor Samuel W. Dudley and Professor Charles J. Tilden. Following is an abstract of the published conclusions.

While it is too early to formulate the more instructive tendencies disclosed, the following facts are indicated: There is no unanimity and surprisingly little definiteness in the views entertained by transportation leaders as to what the relation of schools to the transportation machine could or should be. There is a view widely held that in this practical field nothing but hard won experience in actual service really avails anything.

The courses offered in colleges and schools are often stereotyped, and unrelated to the actual business of transport.

Investigations of a scientific character in the transportation field are surprisingly few and meagre, outside the workshops and laboratories of certain big transportation industries and their affiliated supply agencies.

The demand for instruction in transportation as evidenced by election of or attendance on courses in

colleges is anything but encouraging. Where the demand for instruction on the part of students is substantial, it is largely along vocational lines, outside the regular residential colleges.

On the part of transportation companies there is little or no demand for men simply because they have had a college course, even a college course that purports to give some inkling of the general aspects of transportation. They apparently have little faith in West Point or Annapolis methods in building up the nucleus of future officials, but prefer to take their chances of developing material from the ranks.

There is a widespread expression of feeling among railroad officials that college men as a class are unpromising candidates out of which to make executive heads of transportation companies. College men are said not to be "steady pluggers," are impatient of promotion, and overrate their value to the company.

Where universities offer a rather extensive program of transportation studies to candidates for the first degree, the response has been, on the whole, disappointing. * * * The success of certain broad fundamental courses in railroad engineering is to be ascribed to the fact that engineering principles can often be best illustrated and applied through the study of transportation projects.

The Section Foreman's Stock Report

WHILE THE following article, which was presented before a recent meeting of the Kansas City Southern Maintenance of Way Association by F. W. Middleton, assistant claim agent of that road at Texarkana, Tex., deals specifically with the practices and reports employed on the Kansas City Southern, these practices are in general similar to those of other roads and the suggestions are, therefore, generally applicable. Mr. Middleton's paper is abstracted below:

In about 50 per cent of all our claims, the information furnished on our standard form is all that we have from any employee of the company. It is, therefore, essential that the full details be given as called for on the form. Our records show that enginemen do not report over 50 per cent of all animals struck. There are several reasons for this, but whatever the reasons, they only increase the necessity for the circumstances and conditions surrounding the accident being stated in the foreman's report.

Must Depend on the Foreman

The foreman and his gang in most cases are the only persons who see the stock. The owners—nor for that matter any outsiders—seldom see the animals after they are killed, since they are disposed of by the section forces soon after the accident. We, therefore, should and do expect a thorough report to be made by the foreman.

We frequently find the words "Don't know" as a reply to a question; in many cases questions are not answered at all. Each question has a distinct significance and is placed in the form for a specific purpose.

It is very important that the date be given on the report since three animals of like description may have been killed on three consecutive dates and belonging to three different persons. The day, month and year should be shown plainly.

Of course, we like to know whether the animal is a cow, bull, mule, horse, goat or sheep. If it is a cow, we particularly want to know whether it is a dry or milk cow. If more than one animal show in plain figures how many there are.

The age is asked for as it will have much to do with the value of the animal and the amount that should be paid in settlement of the claim. It is not natural for the owner of an 18-year old mule to show its true age. Sometimes they forget and leave off the "1." With calves, the age should be shown in months. And if eight months old, do not show just "eight" in this space; make it read "months" or "years" as the case may be.

The weight is very material, especially in the larger animals. There is much difference between a mule weighing 900 lb. and one weighing 1,200 lb. The color—whether solid or spotted—and the condition—whether fat, poor, fair or good—should be stated.

Where there are marks and brands, they should be shown. If there are none, state "none." We recently had a case south of Shreveport where the marks were a deciding factor, when two persons claimed the same animal, and the only distinguishing feature was the marks.

The foreman's estimate of value is highly essential and when he is not able of his own knowledge to make a fair estimate, he should make inquiries of disinterested persons to learn a fair and reasonable valuation.

Report the Location Accurately

The first question on our form calls for the location of the accident, between mile posts and stations. If an animal was killed between mile posts 608 and 609, we would say it happened on mile 609.

The name of owner and his postoffice address should be shown. Where he lives in a city of 5,000 or more population, the street address should be given. If on a rural route, give the number of the route and the box number, or give general direction from our station and tracks. In cases where the owner is unknown and after you have held your report up for two or three days, send it in, showing in the space provided "owner unknown." Then if you should at some subsequent date learn the name of the owner of the animal, mail the name and address to the claim agent direct, referring to your report of proper date. By all means do not hold up the report until the name of the owner is learned. This handling has in the past brought on unnecessary correspondence and tracing of these reports.

Show what disposition was made of the carcass, this is, whether burned or buried, and by whom, for the laws of different states provide different methods for disposing of dead animals. If the animal is only injured, state this, and give fully not one but all the injuries the animal sustained. If dead, show if the hide was recovered. In cases where the hide or any of meat were used by anyone, this should be stated, giving names of persons. We have had cases where the claimant had used, and probably sold, some of the animal after injury or death.

The time of the accident should be shown whether day or night and between what hours, if known. Show what day the animal was found, giving also the time of day.

Show where animal lay, with reference to the right-of-way. If you saw the animal, say where it was at the time, that is, whether east or west of the tracks and

how far from them and if dead or alive. If not found on right-of-way, state in the space provided, just where found, using feet in stating distance.

Was the Animal Struck by a Train?

Was the animal struck by a train? This, to my mind, is the most important question on the form and the one first referred to in looking over a claim. Some do not answer this in the affirmative unless they actually witness the accident. I would say that the condition of animals and the general appearance of the roadbed and track would clearly indicate, in most instances, at a glance whether or not injury was caused by a train. If known, the train number should be given and the direction it was moving, if you saw the accident. If not, show how you know it was struck by a train, if you do know. These points are extremely important.

If there were signs and marks on roadbed, show what they were; also about animal tracks; whether the animal had been dragging itself on the roadbed, and if the tracks were those of the animal killed.

If the track is fenced show the condition of the fence and how long the condition has existed, if you know.

The condition of gates, cattle guards and wing fences should be stated thoroughly, especially the gates and their fastenings; also the habits of stock owners with reference to opening or closing the gates, or if usually kept closed. Further, state whether or not you had requested that the gate be kept closed, showing upon whom you made such request. During the month of May we had more stock killed on a certain stretch of track where the gates were down, left open, etc., than we had during all the other months of this year now past. If warnings of any nature had been given stock owners and then their animals killed, this should be shown without fail and the nature of such warning. I recall the case of a pony that was continually getting on the track and several of our trains had come close to striking it. The owner was repeatedly advised to keep the animal up, which was not done and the animal was later killed. We have not made any offer of settlement and will not and the owner has not presented a claim, since we explained to him our position in the matter.

We want to know the true condition of cattle guard where it is involved. We now have pending in the higher courts a case where the condition of a cattle guard was made an important issue in the trial of the case.

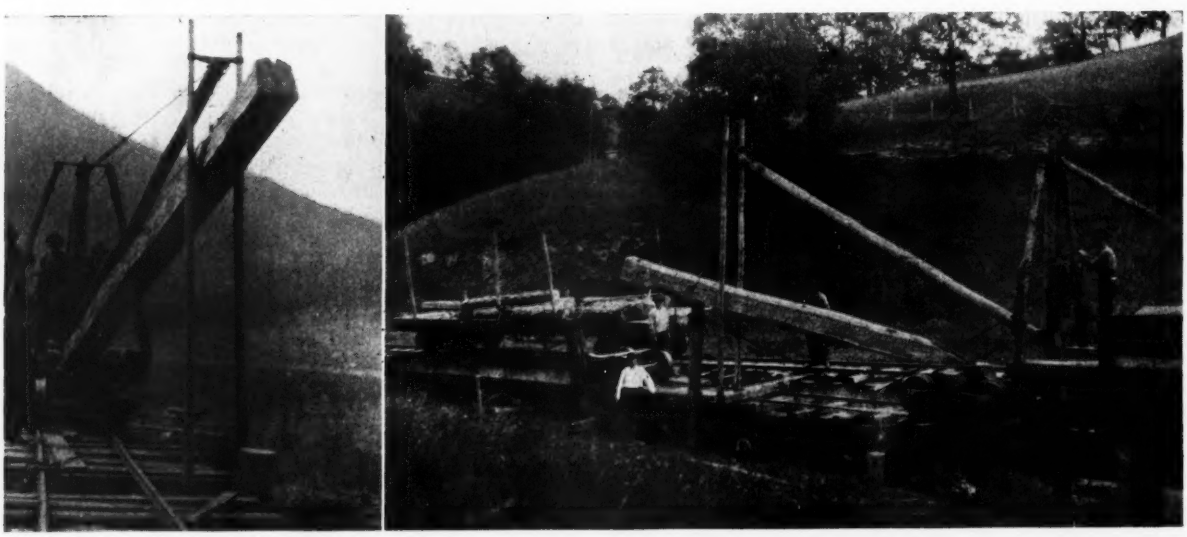
An Unusual Substitute For A Track Driver

A SHORT TIME ago the management of the Walkersville & Southern railroad, a narrow-gage line in West Virginia, was confronted with the necessity for the immediate rebuilding of a pile trestle bridge, although it had no pile driver and was unable to procure one elsewhere within a reasonable time. To meet this situation S. F. Douglas, general manager of this road, conceived the idea of an ingenious substitute constructed of materials readily at hand. Its action corresponds closely to that of a baseball bat, as will be understood from the following description and the photographs.

A green hickory log was secured from which a timber 22 ft. long by 18 in. wide by 25 in. edgewise was hewed by hand. Its weight was approximately 5,700 lb. in the green condition and the cost of material and the labor of hewing it was approximately $30. Such other materials as were used in assembling the device consisted of odds and ends found on the property. This log was secured at one end by means of a home-made hinge joint to a false timber bolster placed on top of a car truck and this truck was set in front of a derrick car, the boom of which had the same overhang as the hickory stick. A pair of poles attached to a crosspiece at the end of the boom served as the driver leads.

The power for hoisting the makeshift hammer was supplied by a locomotive from which a line was passed over the derrick car through a sheave at the top of the mast and another at the end of the boom to a trip hook by means of which it was attached to the heavy timber. Thus as the locomotive backed away the timber was raised and then dropped by tripping the hook. The timber was raised about 9 or 10 ft. at the point where the blow was delivered to the pile, which was about 5½ ft. from the outer end, from which it is calculated that the blow given was approximately equal to that of a two-ton hammer falling an equivalent distance.

The experiment was successful beyond expectations. The piles were driven 7 to 9 ft. through loose rock and gravel to solid rock.



Two Views of the Home Made Pile Driver

The Opening Session of the Wood-Preservers' Convention

Wood Preservers Hold Successful Convention at Cleveland

New Specifications and Other Refinements in Timber Treating Practices Receive Major Attention

THE TWENTY-SECOND annual convention of the Wood Preservers' Association, which was held at Cleveland, Ohio, on January 26-28, was characterized principally by the attention given to the perfection of refinements in timber treating practices to keep pace with the increasing knowledge of the science of wood preservation. As a result, a number of revisions of specifications were adopted in accordance with the recommendations of committees which had been assigned to make critical studies of existing standards. The program also included a number of reports and papers on the more intricate problems arising in the timber preservation industry.

Special attention was given to the treatment of fir timber, specifications being presented for the treatment of fir piling with creosote and of fir ties with zinc chloride. The association also continued its study of the service results obtained from the treatment of ties and other timber. All sessions were presided over by S. D. Cooper, president of the association and assistant manager treating plants, A. T. & S. F. System.

After calling the convention to order President Cooper referred to the large number of new members taken in during the last year, aggregating 90, while the net increase was 32. The membership of the association on January 1, 1926, was 661.

At the concluding session of the convention the following officers were elected for the ensuing year: President, C. F. Ford, superintendent tie and timber department, C. R. I. & P., Chicago; first vice-president, O. C. Steinmayer, superintendent timber preservation, Canada Creosoting Company, Toronto, Ont.; second vice-president, H. R. Condon, assistant forester, Penna. System, Philadelphia, Pa.; secretary-treasurer, E. J. Stocking. Members of executive committee: F. S. Shinn, supervisor treating plant, C. B. & Q., Galesburg, Ill., and J. S. Penney, general superintendent of plants, T. J. Moss Tie Company, St. Louis, Mo. Nashville, Tenn., was selected as the place for the next meeting of the association.

Below are given abstracts of several of the papers and reports presented and brief outlines of a number of others:

C. E. Denney Urges Consistency in Timber Protection

Vast quantities of ties, timber and lumber have been used in the original construction, the extension and renewal of our railroads. The early construction and most of the extensions were built by using local timber. Lumber for maintenance was generally and is now largely secured within a comparatively small distance from its point of use but the length of haul on forest products is gradually increasing and this added transportation expense, together with the increase in the price of lumber and cost of application, fully justify reasonable expenditures to preserve timber.

A representative average figure for the life of treated ties throughout the country has not, so far as I know, been determined but we estimate that well-selected oak, adzed, bored and treated ties now being placed on our line will have an average life of close to 20 years. This will mean 5 renewals instead of 12 renewals of untreated ties.

My understanding of the preservation of timber is rather broad. It includes, of course, treatment to prevent decay. It also includes preservation of standing timber, careful selection and preparation in order to secure the longest possible life after application and proper handling to prevent deterioration before use.

I am convinced that the preservative treatment of lumber will be extended quite generally by the railroads to

include switch ties, bridge timbers and decks and car lumber. Your association can continue to do valuable work in determining and placing before the railroads reliable data as to proper practices covering the handling and treating of lumber and the results to be obtained thereby.

Beginning with properly selected lumber, it follows that satisfactory treatment can be had only by using the best material that can be had at consistent prices. It is equally as unwise to use inferior treatment as to use lumber which does not meet recognized specifications. I am particularly interested in the relative merits and prices of imported and domestic creosote and am hopeful that the entire situation may develop to the end that we may secure an ample supply of high grade material at a reasonable price. This will ultimately determine the extent to which the users of timber will subject it to treatment.

Table for Determining the Average Life of a Group of Ties From Records of the Percentage of Ties Renewed in Any Given Number of Years

Per Cent Renewed	Per Cent of Life	Per Cent Renewed	Per Cent of Life	Per Cent Renewed	Per Cent of Life
1	45	36	86	71	106
2	50	37	87	72	107
3	55	38	87	73	107
4	60	39	88	74	108
5	63	40	88	75	108
6	65	41	89	76	109
7	66	42	89	77	109
8	68	43	90	78	110
9	69	44	90	79	110
10	70	45	91	80	111
11	70	46	91	81	112
12	71	47	92	82	112
13	72	48	92	83	113
14	73	49	93	84	114
15	74	50	93	85	115
16	75	51	94	86	115
17	75	52	94	87	116
18	76	53	95	88	117
19	77	54	96	89	118
20	77	55	97	90	119
21	78	56	97	91	120
22	78	57	98	92	122
23	79	58	98	93	125
24	80	59	99	94	127
25	80	60	99	95	130
26	81	61	100	96	135
27	81	62	100	97	140
28	82	63	101	98	150
29	82	64	102	99	170
30	83	65	102	100	190
31	83	66	103		
32	84	67	103		
33	84	68	104		
34	85	69	104		
35	86	70	105		

Note.—Estimates of life should not be based on less than 10 per cent renewals.

Report on Tie Service Records

As in previous years the Committee on Tie Service Records presented a table showing the average annual tie renewals per mile of track on a number of different railroads over periods ranging from 7 to 25 years. The table presented this year, which is reproduced in part below, covers the records of 24 railroads having a total mileage of 187,231 miles of all tracks.

The committee also presented a table which gives in tabular form the same information which has previously been presented in the form of a curve showing the relation between the percentage of tie renewals at any time in the life of any group of ties and the average life of all of the ties in that group. The members of the committee have found this table more convenient for practical use than the curve.

Wood Preservation and Forestry

By Aldo Leopold
United States Forest Products Laboratory, Madison, Wis.

[Mr. Leopold outlined investigations now being made of the structure of wood with the aid of x-ray photographs pointing to the bearing which these studies have on the future developments in timber preservation. Following are abstracts from his paper which indicate the

AVERAGE CROSSTIE RENEWALS PER MILE OF ALL TRACKS

	A. T. & S. F.	B. & O.	C. B. & Q.	C. & E. I.	C. C. C. & St. L.	C. M. & St. P. Eastern Lines	C. R. I. & P.	D. L. & W.	Gt. Northern	Ill's. Central	K. C. Sou.	Lehigh Valley	Mich. Cent.	M. K. T.	Monon C. I. & L. Ry.	N. Y. C. (East)	N.Y. C. (West)	Nor. Pacific	Penna.	Soo Line (M.St.P.&S. Ste. M.)	Southern Pac. (Atlantic Syst.)	Southern Pac. (Pacific Syst.)	Union Pacific	C. R. of N. J.	Miles	Roads	Weighted Average Ties	Weighted Average 5 Yrs.
1900	192	.....	.....	284	.....	.....	.....	216	225	.....	.....	336	269	.....	.....	.....	.....	341	294	.....	281	.....	261	218	53,036	11	267	.....
1901	166	248	.....	290	.....	210	.....	278	229	.....	.....	301	241	404	.....	228	.....	324	291	.....	278	.....	242	273	79,825	15	255	.....
1902	204	196	.....	228	.....	213	.....	201	184	.....	.....	108	282	401	.....	210	.....	311	273	.....	293	.....	229	268	83,024	15	237	.....
1903	241	192	.....	198	.....	144	.....	223	189	.....	.....	307	237	437	.....	207	.....	314	244	.....	269	.....	186	246	85,033	15	231	.....
1904	271	225	.....	133	.....	121	.....	227	185	.....	.....	211	141	460	.....	243	.....	280	217	.....	197	.....	303	275	87,779	15	226	243
1905	256	247	.....	109	369	97	.....	247	162	.....	.....	196	148	387	.....	175	246	286	279	.....	233	.....	266	327	97,543	17	234	237
1906	197	245	.....	148	392	116	.....	223	125	.....	.....	155	173	344	.....	176	257	280	241	.....	339	.....	374	206	100,642	17	226	231
1907	288	254	.....	217	301	94	.....	240	241	.....	.....	184	110	358	.....	263	261	346	267	.....	258	.....	317	202	103,034	17	251	234
1908	301	266	.....	199	275	176	285	277	248	.....	.....	172	110	292	.....	225	266	251	198	.....	244	.....	258	247	115,111	18	239	235
1909	293	264	.....	121	198	202	276	235	249	.....	.....	195	272	365	310	220	250	296	262	.....	259	.....	283	259	118,175	19	257	241
1910	281	218	.....	200	384	203	246	169	293	.....	462	177	176	449	257	249	250	292	240	.....	289	.....	267	242	122,004	20	238	242
1911	269	206	.....	134	388	159	265	223	262	290	432	141	285	466	396	229	260	284	235	.....	267	.....	246	204	133,881	21	255	248
1912	220	278	.....	189	318	163	209	231	228	267	294	164	208	401	385	219	265	287	290	.....	299	.....	171	220	137,083	21	247	247
1913	193	259	.....	289	282	208	221	281	237	286	351	267	305	342	360	259	295	317	261	258	271	.....	231	240	144,967	22	257	251
1914	178	220	231	202	269	190	243	255	232	266	355	232	284	324	365	271	242	306	292	287	295	.....	248	224	159,796	23	250	249
1915	207	309	227	255	277	183	249	279	229	253	354	289	335	325	231	243	301	276	314	256	384	.....	238	189	161,604	23	263	254
1916	201	310	203	244	212	251	222	195	250	228	338	286	357	382	289	207	273	247	287	196	367	.....	253	156	163,095	23	252	254
1917	158	238	192	187	202	135	183	157	244	179	240	178	227	235	145	197	270	292	212	228	196	.....	196	127	166,518	23	202	245
1918	154	194	194	166	205	228	155	121	250	161	237	173	197	209	168	199	249	230	174	207	218	258	191	127	178,879	24	196	233
1919	143	243	162	141	201	242	158	147	253	198	273	195	144	228	80	199	189	220	211	266	267	268	185	132	179,851	24	204	223
1920	163	255	178	102	156	146	190	159	213	250	290	116	126	302	167	164	183	242	202	289	389	272	206	114	181,989	24	206	212
1921	149	229	177	63	194	161	159	166	184	260	310	133	154	233	146	220	196	231	232	342	391	257	184	181	182,456	24	209	203
1922	158	206	167	131	143	188	151	137	191	249	249	77	222	183	146	199	196	167	232	301	319	243	203	142	182,988	24	198	203
1923	128	207	169	158	191	225	140	102	220	199	227	91	206	179	144	201	147	177	211	323	294	226	195	116	184,358	24	183	200
1924	115	192	150	92	139	204	118	85	201	170	225	109	214	213	153	173	129	163	177	336	265	196	215	133	187,231	24	174	194
1925	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1926	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Per cent treated of 1922	88	75	92	99	87	.....	92	81	52	78	51	79	90	93	99	66	79	38	68	22	80	43	100	98	.....	.....	.....	.....
All ties used 1923	.....	78	.....	99	80	90	98	87	35	82	58	96	56	98	97	83	89	18	74	17	65	52	100	98	.....	.....	.....	.....
1924	.....	87	.....	99	91	.....	98	91	50	.....	70	95	.....	100	.....	81	91	38	.....	17	66	64	98	99	.....	.....	.....	.....
1925	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Per cent treated of 1924	70	60	.....	98	83	60	80	82	40	.....	55	70	.....	63	.....	52	85	52	44	9	44	57	64	.....	.....	.....	.....	.....
Ties in track 1925	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Note—Horizontal lines show beginning of extensive use of treated timber.

significance of these and other projects in research.]

Your industry and our profession are both good samples of modern "research." We have piled up a great mass of facts—information on what happens—but we have in general neglected to find out *why* things happen. We have learned the peculiarities of trees, and railroad ties, and creosote, and the other things we work with, but we have not penetrated the reasons for those peculiarities.

Take, for instance, the injection of preservatives. By juggling a few of the variables like time, temperature, and pressure you have learned how to treat the easier woods in a satisfactory manner. But it doesn't look as if these same methods are going to tell us how to penetrate refractory woods, or prevent checking due to heat-injury, or to completely penetrate building lumber.

Now the practical point is that these researchers who are digging into basic questions about wood are the men who from now on are going to make possible the improvements in the uses of wood. We will progress from now on just as fast as research in these basic materials lays foundations for it, and no faster. We must play longer chances. With a thousand dollars to play with, we often used to have a 1 to 2 or 1 to 3 chance of finding a better pressure or a better temperature or a better oil. In the future it will take larger sums and longer periods of time to be worth playing at all. But on the other hand, the possible value of our findings will be vastly greater. Heretofore a new discovery might help a dozen plants; in the future a new discovery may help a score of industries.

S. D. Cooper
President, American Wood-Preservers' Association

We all know that in the last few years the railroads have been raising the acceptance standards for cross ties. We all know that higher acceptance standards mean greater wood wastes and decreased stands of timber suitable for ties. This affects forestry, because the main function of forestry is to supply the country with wood, and the principal means of doing this are to increase the stands of timber and decrease the wastes incident to using it which have long prevailed.

It is not my intention to discuss the general justifiability of higher standards—it seems to me that such discussion is idle—but rather to plead for the critical examination of each item entering into those standards, to make sure that each and every one actually accomplishes the purpose for which it was adopted in a practical way.

To illustrate: One western railroad is considering a specification which will reject ties made from dead lodgepole. Now it is obvious that the purpose of that specification is to exclude ties that are weak, or in danger of decay or checks. But it is not obvious that ties from dead lodgepole are weaker than those cut from live trees.

They are doubtless checked more at the time of inspection, but they may not be by the time they are in the track—they may be through checking at the time of inspection whereas the green ones are not. As for decay, if any tie is actually decayed at the time of inspection, it ought to go out on those grounds rather than because it is made from a dead tree. If it is a question of incipient decay or infection, maybe the temperatures used in treating are such that sterilization is certain. All these "ifs" are questions of fact, and most of the facts can be determined by actual study.

Many Technical Problems Discussed

Advancement in the art of wood preservation gives rise to the necessity for the scientific studies of various phases of the subject covering such matter as the behaviour of the reagents and their effect on wood. Much of this work is being carried on by the specialists on the staff of the United States Forest Products Laboratory at Madison, Wis., while some of it is conducted as committee work by the association. Among the more involved technical matters presented before the convention are those covered in the papers on the Method of Calculating the Viscosity of Mixtures of Creosote and Petroleum, by E. Bateman and R. Baechler; Two Visual Methods for Testing the Penetration of Sodium Fluoride in Treated Wood, by Mr. Bateman and C. Henninesen, and a report on Beta Naphthol as a Wood Preservation, by Galen Wood, chemical engineer, Philadelphia, Pa. A number of the other papers are reviewed below.

Petroleum Oils in Timber Preservation

The Committee on Ties had been instructed to prepare for inclusion in the manual methods of treatment with petroleum and creosote, petroleum and coal-tar solution and petroleum and zinc chloride, but in the opinion of the majority of this committee it is not yet time to prepare specifications for the treatment with the various mixtures of creosote and petroleum.

In trying to get together on a specification for mixture treatment, the committee ran against a stumbling block in the lack of an approved specification for petroleum to be used in the mixture. It was found that almost every plant using mixtures was using a different petroleum, and that the petroleum used at one plant with very satisfactory results could not be used at another plant It is the thought of the committee that specifications for the manner in which any proposed preservative is to be applied should not be written and approved by the association until that preservative has proved its merits and specifications for it have been adopted.

Temperature and Viscosity of Preservatives as a Factor in Treatment

J. D. MacLean, engineer in forest products, United States Forest Products Laboratory, Madison, Wis., presented a paper giving the results of tests which were carried out to determine the relation of temperature and viscosity of wood preservative oils to the penetration and absorption of these oils by wood in treatment. Mr. MacLean's conclusions are given in part below.

Increasing the proportion of petroleum oil in the mixtures decreased the penetration.

The absolute viscosity, which is dependent upon the treating temperature and the kind of preservative oil used, is a most important factor affecting treatment. For a given species and treatment with oil preservatives in general it appears that the relation between viscosity and average penetration can be expressed by a mathematical equation. The same is true for a given species and a particular treatment. A convenient method is thus obtained for comparing the relative influence of different viscosities on treatment.

Although the ties treated with creosote had an appreciably higher moisture content than those treated with the mixtures, in every case but one the creosote gave

the best penetrations and absorptions at each of the temperatures used. An average for all treatments made with a given preservative shows that the absorption obtained with creosote was about 10 per cent greater than that obtained with the mixture of 50 per cent creosote and 50 per cent petroleum oil, and was about 25 per cent greater than that obtained with the mixture of 10 per cent creosote and 90 per cent petroleum oil. The corresponding average side penetration obtained with creosote was more than 11 per cent and 23 per cent greater than those obtained, respectively, with the two mixtures.

Report on Preservatives

Among other matters reported by the Committee on Preservatives was a review of current developments in the way of new materials offered for use as wood preservatives. The committee reported that it had learned of no new reagent for this purpose but presented a statement concerning the present status in the development of low temperature tars, the committee's statement in this regard being in part as follows:

During the past year, six plants of commercial importance have operated or attempted to operate, and another plant, has just been completed. While the aggregate capacity of these plants is in the neighborhood of 5,000 tons of coal per day, operations for the year have not resulted in the production of more than 1,000,000 gal. of low temperature tar. No case is known where this tar or distillate from the tar has found its way into the wood preserving industry during the past year on any but an experimental scale.

This committee also submitted revisions of the Association's Manual of Standards and Recommended Practices with regard to the following items:

1. Sampling of Creosote Oil in Tank Cars, 2. Standard Method for the Determination of Coke Residue in Creosote Oil, 3. Standard Float Test for Residue in Creosote Oil, 4. Standard Distillation of Creosote Oil, 5. Standard Method for the Determination of the Amount of Water in Creosote Oil, 6. Standard Specifications for Creosote Tar Solution for Ties and Structural Timber and 7. Standard Abridged Volume Correction Table for Petroleum Oils.

Three New Specifications Presented

As the result of work by committees three new specifications were presented. Tentative specifications were submitted for the preservative treatment of Douglas fir piles by pressure processes and for the preservative treatment of Douglas fir ties by pressure processes, while the Committee on the Non-Pressure Treatment of Poles presented a specification for inclusion in the manual.

The Committee on Inspection presented a number of changes in arrangement and some minor revisions of the Standard Instructions for the Preservative Treatment of Wood. Similarly, the Committee on Revision of the Manual offered some modifications of the Standard Specifications for the Preservative Treatment of Douglas Fir Cross Ties by Pressure Processes.

Other Subjects Discussed

A comprehensive review of the present status of the extension of timber preservation to car lumber was presented by a committee assigned to that subject. This report disclosed the fact that a considerable number of roads are using treated lumber in freight cars on an experimental basis and that some railroads have carried these tests over a sufficient period to demonstrate the economies resulting from this practice.

The Committee on Posts reported that little further development could be made in the treatment of posts such as are used for right-of-way fences until further data could be obtained through the establishment of test sections and the committee urged that efforts be made to prevail upon the railroads to undertake tests of this kind.

Reuben W. Smith, assistant professor of timber preservation in New York State College of Forestry, Syracuse University, Syracuse, N. Y., reviewed the present status of forestry in this country and outlined the relation of forestry to the timber preservation industry. He also made an appeal for the employment of forest school graduates in the industry.

The Committee on Steam Treatment presented the results of tests to determine the effect of steaming and vacuum on the absorption and penetration in various species of wood. The following is a brief abstract of the conclusions accompanying this report. Results of these experiments show that in all of the runs the ties gained in weight during the steaming treatment and only in the case of green ties did the subsequent vacuum reduce the moisture content to a point equal to or less than that of the wood before steaming. This substantiates results obtained in tests of this kind made with similar equipment at the Forest Products Laboratory. The laboratory tests however were made on small size specimens and on individual ties.

Center Road Signal Affords Better Crossing Protection

A NUMBER of trial installations have been made of highway crossing signals placed in the center of the highway to overcome the objection frequently offered by automobilists that a crossing sign placed at the side of the road may be easily overlooked because it falls outside the normal angle of vision of the driver, particularly in night driving. The photograph shows an example of a highway crossing signal of this type erected by the State Highway department of Delaware at Wyoming,

The Middle-of-the-Road Crossing Signal at Wyoming, Del.

in that state, on the Pennsylvania railroad 51 miles south of Wilmington. This warning sign consists of three individual elements, the ordinary "cross buck" signal on a vertical mast, a red flashing light signal and a fence at the base which is striped so as to give a very conspicuous appearance.

An added safety factor of this form of protection as with other center-of-the-road warning signals is the fact that the lane of the highway approaching the track must be curved to the right to avoid the base of the signal, thus requiring the drivers of vehicles to reduce speed in approaching the crossing.

Loading Test Ties at the Forest Products Laboratory, Madison, Wis.

Producers Discuss Crosstie Supply At Cleveland

Limited Demand and Good Crops Are Curtailing Production. Higher Prices Expected.

THE NATIONAL Association of Railroad Tie Producers held its annual convention at the Hotel Cleveland, Cleveland, Ohio, on January 28 and 29. The meeting was well attended and active interest was taken in the addresses describing business conditions as a whole and particularly in the railway industry.

In opening the convention Howard Andrews, president of the association and also president of the Nashville Tie Company, reviewed the activities of the past year from the standpoint of the tie producer. He stated that last year was one of limited demand, resulting from a large carry-over of ties from the preceding year. He also referred to the reductions in demand that are resulting from the increased number of ties treated. He stated that the fluctuation in demand for ties constitutes a heavy tax on the production cost for ties cannot be produced in a day. In view of the reduced consumption that may be expected with the increasing number of ties treated, he urged producers to be conservative in their production activities. He suggested the compilation of statistics of production, of stocks and of probable requirements of the railways in order that producers can proceed more intelligently with their operations and thereby reduce their financial losses as well as the deterioration that results from stocks awaiting sale.

In welcoming the convention to Cleveland, J. J. Burnett, president, N. Y. C. & St. L., referred to the great progress that has been made in the standardization of ties in recent years and emphasized the necessity for further stabilization of purchases to enable production to be maintained more uniformly, and the cost of production to be reduced. He also urged tie producers to encourage the treatment of ties as a means of postponing the introduction of substitute ties. It has been demonstrated, he said, that treatment enables the annual cost of a tie to be reduced and since the annual cost is a determining factor in the selection of ties, treatment has arrested the rising cost of ties and delayed the introduction of ties of other materials.

E. E. Pershall, (vice-president, T. J. Moss Tie Company, St. Louis, Mo.), representative of the association on the American Engineering Standards Committee on Cross Ties, reported that since the last meeting the standardization of tie specifications by the sectional committee of the American Engineering Standards Committee had progressed to the point that unanimous agreement had been reached. The National Association of Railroad Tie Producers had been unsuccessful in its contention for a tolerance of ½ in. in the width of ties, and has accepted the tolerance of ¼ in. upon which the remainder of the committee agreed. The American Engineering Standards Committee's sectional committee on ties will now refer the proposed standards to the sponsors, the American Railway Engineering Association and the United States Forest Service, for approval and transmission to the main committees of the American Engineering Standards Committee.

A committee was appointed with E. A. Nixon, vice-president, Western Tie & Timber Co., chairman, to suggest to the railroads the advisability of their studying the conditions of tie production with the idea of co-ordinating their requirements with the conditions confronted by the tie producers in an effort to increase the consumption of the smaller sizes, grades 1 and 2, by confining the larger sizes to main tracks.

E. E. Pershall, vice-president, T. J. Moss Tie Company, was appointed chairman of a committee to present to the railways the belief of the producers that a round tie 7 in. thick and 7 in. wide (on top) is superior to a tie 6 in. thick and 8 in. wide (on top) with a view to having its price fixed higher than the 6-in. by 8-in. tie.

At the closing session of the convention on Friday the following officers were elected:

President, John T. Logan, president, National Lumber & Creosoting Co., Texarkana, Tex.; First Vice-President, C. D. Christian, Standard Tie & Timber Co., Meridian, Miss.; Second Vice-President, J. A. Tiller, Johnson & Tiller, Little Rock, Ark.; secretary, E. A. Morse, vice-president, Potosi Tie & Lumber Co., St. Louis, Mo.; treasurer, R. M. Killey, Acme Tie Co. of Michigan, Reed City, Mich.; District Directors: Pacific Coast District, E. H. Meyer, vice-president & general manager, Chas. R. McCormick Lumber Co., Portland, Ore.; Rocky Mountain District, Otto Gramm, president, Fox Park Timber Co., Laramie, Wyo.; North Central District, W. J. Foye Foye Lumber & Tie Co., Omaha; Northeastern District, F. C. Parrett, general manager, Baker Wood Preserving Co., Washington C H, Ohio; Southeastern District, W. W. Andrews, secretary and treasurer, Nashville Tie Co., Nashville, Tenn.; South Central District, John Fuhrer, secretary and treasrere, Egyptian Tie & Timber Co., St. Louis, Mo.

Nashville, Tenn., was selected as the location for the next convention.

Colonel Greeley Addresses Annual Dinner

Colonel W. B. Greeley, forester, U. S. Department of Agriculture, Washington, D. C., was the speaker at the annual dinner which was held on Thursday evening. He took the forestry outlook as his subject and traced the increasing necessity for reforestation as transportation becomes an increasingly large part of the cost of forest products, owing to the recession of the forests from industrial centers and other points of consumption. As long as virgin timber was available near at hand, forestry had no place in the business life of America, but when the forests receded west of the Rocky mountains, forestry became an economic necessity. While in its early stages, Colonel Greeley traced the progress that has been made in the commercial reforestation operations by national and state governments, lumber companies and others, a development which bids fair to increase as the price of lumber rises.

Dr. Von Schrenk Reviews European Tie Practices

In reviewing his observations of cross tie conditions in Europe, Dr. Herman Von Schrenk, consulting timber engineer, St. Louis, contrasted the high cost of material and the cheapness of labor in Europe with the opposite conditions in this country. As a result the European railways have given intensive study to the care of their timber, whereas in this country we do not regard ties or other material as highly. For many years the European railways have been endeavoring to secure the maximum life from their cross ties, renewals on the French Eastern railway being 52 per mile of track in 1925, while Dr. Von Schrenk saw many ties in track carrying dating nails of 1873-75. At the same time they have been developing reforestation until in many cases they are growing tie timber with sufficient rapidity to meet their demands. Furthermore, the merchandising of trees has been developed to such a high point in many parts of Europe that trees are cut with a view to all of the products they will produce rather than merely ties. In other words, they cut only the trees that will make ties of proper size and allow the rest to grow. In England Dr. Von Schrenk stated that track is rebuilt out of face at intervals of 20 years at which time approximately 25 per cent of the ties removed are classified as No. 1 ties and returned to main tracks for another 20 years service, while about 70 per cent are classed as No. 2, showing some decay in the heartwood and are sawed into posts, slabs and similar forms, while the remaining 5 per cent of the ties are too far decayed for further use and are sawed up for engine wood. His conclusion was that the railways of Europe have learned to help themselves in the production of their tie supply, a lesson which American railways must also learn. The solution of the problem of the future tie supply requires the joint co-operation of producers and users of ties alike.

J. H. Waterman Urges Selection of Ties for Specific Purposes

In speaking extemporaneously on the "Future Cross-tie Requirements of the Railroads" J. H. Waterman, superintendent timber preservation of the C., B. & Q., Galesburg, Ill., dwelt at some length on the fact that in the last forty years there have been increases in the sizes of tie plates, rail anchors, spikes and other parts which go to make up the track structure, as well as enormous increases in the sizes of locomotives and rolling stock, while at the same time there had been no great increase in the size of the cross-ties. Mr. Waterman expressed the opinion that one of the factors which reacts to the detriment of the tie-producing industry, is the lack of proper distribution and he also expressed the opinion that the tie-producers should educate maintenance-of-way men to the advisability of using the proper size cross-ties for the various purposes.

He brought out the fact that of the 400,000 miles of railroad tracks in the United States, approximately 150,000 miles consist of passing sidings and yard tracks, and that there is no excuse for putting large high-grade cross-ties in tracks of such character. He suggested the advisability of maintenance-of-way men analyzing the particular requirements of each class of track with the idea of using cross-ties particularly suited to each. He also suggested the advisability of tie producers and railroad officers co-operating in the preparation of a "budget" for cross-tie requirements for different classes of track.

In closing, Mr. Waterman brought out the fact that the tie-producing industry operates as a rule, on either "a feast or a famine" basis, depending upon the demand by the railroads for the product. He suggested that in many instances, the producers themselves could profitably and economically install tie-treating plants at strategic points with the idea of absorbing excess production during periods when the demand was slight.

Other Addresses

Addresses other than those abstracted below included a review of The Business Outlook by John C. Howell, chief of the commodity department, The Brookmire Economic Service, New York; "Tie Siding, How and Where to Sell It" by Arthur T. Upson, National Lumber Manufacturers' Association, Washington, D. C.; "The Importance of the Tie Industry in Our Program of Forest Thrift" by R. D. Garver, assistant chief, Section of Industrial Investigation,

Forest Products Laboratory, Madison, Wis., and "The Effect of Railroad Consolidations" by E. T. Howson, editor, *Railway Engineering and Maintenance.*

Producers Must Meet Railroad Requirements

By E. R. Ross

Marsh and Truman Lumber Co., Chicago

Years ago the railroads endeavored to secure nothing but white oak ties, complying with a general specification that required the tie to be six inches thick with no restriction as to face or percentage of certain widths. Today, our specifications are definite as to thickness and width and the railroads can place a value on each size needed as well as utilize practically all of the sizes and shapes that are made from the timber. By knowing the sizes they will receive the engineering departments of the railroads have been able to get the maximum value out of the timber by specifying the larger sizes for main line tracks and the smaller ties for side tracks, industrial tracks, etc.

Many tie producers have been complaining about the restrictions the railroads are placing on their orders for cross ties in that they do not purchase enough of the smaller ties, i. e., No. 1 and No. 2, to utilize the run of the woods or natural production of the timber. In going into this matter I find that localities in the south and southeast produce most of the cross ties on saw mills, and make about 25 per cent of grades 1 and 2, while in the southwest where most of the ties are hewn and from small timber the natural production of grades 1 and 2 runs between 35 per cent and 50 per cent. As the southwest producers seem to be having the most difficulty in this respect you will be interested in excerpts of letters received from railroads depending upon that territory for their cross ties.

The Missouri Pacific advises that "this road uses all grades of ties, namely, grades 1 to 5, inclusive. We do not restrict the percentages of grades 1 and 2; in fact, we do not get enough ties of these grades for our side tracks and we are forced to use main line ties in our side tracks."

The St. Louis-San Francisco advises that "We do not specify any certain proportion of each grade and as we take all of the small ties offered it would hardly be to the advantage of the producers for us to specify greater number than we have been getting. Most of the smaller ties which we are now getting are coming from the second cuts or tops of trees from which the larger ties are made, thereby making use of timber that would otherwise be wasted."

The railroads are keenly interested in the production of cross ties and I believe it is up to those that expect to supply cross ties or other timber products to adjust their production to the railroads' present day needs. There is no question in my mind that the railroads require a larger tie than they did 25 years ago. In 1901 the Northern Pacific reports that it was using rails weighing from 45 lb. to 80 lb. per yard, while in 1924 only 36 per cent of their rail weighed 80 lb. and less and 64 per cent weighed from 85 lb. to 130 lb. This same road reports that in 1901 328 tons of revenue freight were handled per train and in 1924, 629 tons. In 1901 the locomotive weight was 116,200 lb. and in 1924, 218,400 lb. In 1901 the freight car capacity was 26 tons and in 1924, 39.8 tons. This is typical of conditions on other Class I railroads. As heavier rail is used more and more, the demand for the larger tie will increase.

As the cost of labor and of cross ties is getting higher year by year and as creosoting adds to the initial investment we should be careful to produce better ties of the sizes and kinds needed in order to prevent any substitute for the wooden cross tie coming in. Those producers that have convinced themselves that they are unable to make ties without 50 per cent of grades 1 and 2 should bear in mind that the Santa Fe has an annual requirement of three million cross ties, most of which are produced along their lines, and that they secure approximately 90 per cent of 7 in. by 8 in.-8 ft. and not over 10 per cent of 6 in. by 8 in. and 7 in. by 7 in. ties.

Reports from the Tie Producing Areas

An important feature of the programs of the Tie Producers' Association is a review of conditions in the six districts in which the United States has been divided, presented by the directors of the respective districts. These reviews are abstracted below.

Production Low in the South Eastern District

By H. C. Woolf

The Harmount & Woolf Tie Company, Winchester, Ky.

This district includes Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama and Mississippi. This is a large district and normally produces a large number of ties, chiefly oak, cypress, pine and gum.

During July, August and September, and part of October, the country was visited by the worst drought in years. Many small mills cutting ties, were forced to shut down on account of lack of water and remained idle for two months or more. Many forest fires were reported and great damage to standing timber done. When the rains did come, they came with a vengeance so that during October, November, December, and so far in January this year the southern states have been flooded, while in Kentucky, Tennessee, and north Georgia we have had excessive rains and recently a large amount of cold weather, snow and ice. These weather conditions have curtailed production to a large extent and, at the present time, it is practically paralyzed.

Labor conditions over most of this district are, and have been, normal. However, a considerable labor shortage has developed in Florida, Alabama, Mississippi, and south Georgia. This is caused chiefly by labor agents gathering up laborers and sending them to south Florida to work in the construction of new buildings, and on railroads.

The small cotton farmers, particularly of Alabama and Mississippi who, as a rule can be depended upon to make a few ties, had an exceptionally good cotton crop last year and have been busy gathering their crop and marketing it. Therefore, they don't have to make ties. All of these things tend to create a labor shortage and affect the production of ties.

The production of ties in the southeastern district during 1925 was the smallest for several years. To some extent this is accounted for by bad weather conditions and a labor shortage in some sections, but it is caused chiefly by a small demand and likewise low prices. Many mill men who formerly cut cross ties have found it more profitable to cut lumber as lumber prices throughout the district have been good and are getting better at present. The high price of stumpage is also having its effect on the production of ties. This is especially true of cypress and long leaf pine. The prevailing price for cypress stumpage at present is from $10 to $12 per thousand feet and for long leaf pine $7 to $8.

The demand for ties from January to May, 1925, was fair, but from May to October the demand declined steadily. During October the market revived a little when orders for some 350,000 mixed oak, sap pine, and gum ties were placed in the south to be shipped by water to eastern ports. However, few of these ties have been shipped. The demand for ties in this district for shipment to northern roads has been light, but the demand from the local roads has been sufficient to take care of the production of the kinds of ties they use. For the past few months, the demand from the local roads has been increasing and some few of the roads have not only been buying all the ties they could on their own lines, but have buyers out over a large part of this district buying ties to take care of their immediate requirements. This sharp demand has caused an increase in price of five cents to ten cents with an additional increase likely.

The demand from the roads traversing this district promises to be good for the coming year and on account of so few ties being produced at present, something must be done to increase the production if these roads are to get their requirements when needed. The demand of the northern roads for ties to be shipped by rail is increasing some but promises to continue light for the coming year, while the demand for ties for coastwise shipment to eastern ports is increasing and will likely be about normal.

Stocks of ties on hand now are smaller than for many years. The yards of some of the treating plants are fairly well stocked with ties now in the process of seasoning but there are scarcely any ties to be found along the line in the producing territory ready for shipment.

With increasing demand, not only in numbers, but especially for better quality, with emphasis on "quality," with production at the lowest ebb in years and the cost of production steadily increasing, with labor prices strong and advancing, while the price of ties has been unusually low, and with stocks of ties very low, it would seem that if the northern roads expect to get any substantial part of their requirements from this district during this year, some means must be found at once to stimulate the production of ties.

Good Crops Retard Production in the South Central District

By R. E. McKee

Assistant Manager, The Long-Bell Lumber Company, Kansas City, Mo.

In the south central district, which comprises Iowa, Illinois, Missouri, Kansas, Oklahoma, Arkansas, Louisiana and Texas, the weather has been anything but favorable for the production of ties during the last 90 days, especially in the four southern states on account of the excessive rains which have made it difficult to produce and haul hewn ties and logs. In some sections the supply of labor has also been short, while in other sections there appears to be a plentiful supply, although usually of the inefficient and indifferent type. Improved farm conditions and a good cotton crop have taken a large amount of the better labor as the farmers have been in a position to pay better wages. As a result of these conditions, production throughout this district has been less than normal, while the stock of ties in the hands of the producers is lighter than at any time during the last three years. The demand for cross ties has also been light during the past 90 days as a result in part of ample stocks of cross ties by the railroads, and also due to the reduced demands as a result of treatment. In view of the present light demand and the light production, it is reasonable to expect that we should see a higher market for cross ties in all woods. This is further supported by the fact that it is becoming necessary to procure ties at further distances from the railroads while stumpage values are also increasing constantly.

Rising Prices Anticipated in the North Eastern District

By R. M. Killey

Acme Tie Company of Michigan, Reed City, Mich.

The Northeastern district, including the region north of North Carolina and east of Wisconsin presents many widely varying conditions in the cross tie industry. The production of chestnut ties in New England showed a falling off in 1925 due to the effects of the chestnut blight. The production of cedar ties was also lower than usual due to an unfavorable winter for logging and to the depletion of cedar timber. The production of native hardwood ties in New England during 1925 was heavier than in 1924, due to the growing tendency of New England railroads to buy hardwood ties along their lines and to have them treated locally. New England railroads import large quantities of yellow pine ties from the south, but this was curtailed in 1925 due to the falling off of tie production in Florida and also to the substitution of native hardwood ties by some railroads previously using pine ties. During the past season, New England tie producers, especially those making hardwood ties of standard grades had ready sale for their product at satisfactory prices.

In portions of New York, New Jersey and Pennsylvania, recent years have shown a marked increase in the production of local ties. In these states which cannot be regarded as tie producing states in the strict sense of the word, the building of good roads through the country has tended to encourage tie production by small mill operators, and in view of the fact that the prices paid by the railroads for local ties have been generally good, the local production has increased. This increase of local production in these states, together with the fact that the railroads have decreased their tie requirements by the use of preservative treatment, has made it possible for the railroads to reduce the number of ties imported from states farther south.

In the upper peninsula of Michigan there was a heavy production of cedar ties during the winter of 1924-1925; in fact, the production was such that a considerable number of cedar ties were carried over by the producers into the 1926 season. This was especially true of the smaller size cedar ties, the demand for which seems to show a marked decline during

recent years. In both upper and lower Michigan the demand of the local railroads took all of the native hardwood ties, principally hard maple and beech, which were produced. Saw mills in this section make a practice of sawing the hearts of maple and beech logs into cross ties and switch ties. The demand for ties of this class was good during 1925, at prices which were fair in comparison with the prices paid for corresponding grades of hardwood lumber.

Portions of Virginia, West Virginia, Maryland and Ohio comprise the principal tie producing regions of the northeastern district of this association. In southern Ohio the production of ties was low during 1925. The demand during a portion of the year was not active, but the stock of standard ties left on the producers' hands at the end of the year was low. In portions of West Virgina the production exceeded the demand during the first half of the year but the demand during the latter part of the year took the surplus from the producers' hands. In Maryland and Virginia the production of ties during 1925 showed an increase over the previous year, due to an increased local demand for ties by some of the railroads serving those states.

Summing the situation up, it may be said that the outlook for 1926 seems to indicate that tie producers of this region will find a ready sale for their product during the year at prices equal to or better than those paid during 1925.

Ample Supply in the Rocky Mountain District

By Otto Gramm

President Fox Park Timber Company, Laramie, Wyo.

The tie situation in southern Wyoming is about normal. As the railways in the southern part of the state have a supply of ties on hand, the demand is not great although the tie producers have orders on hand for a normal number of ties for 1926. In the northern part of the state an increased demand is anticipated. As a whole, the tie business has been good although prices have been cut about 10 per cent in the southern part of the state and will not show much profit for producers in 1926. The outlook for this year is that the production will be below normal because of the decrease in prices and the further fact that the railroads have reduced the number of ties that they will take.

Production 25 Per Cent Low in the North Central District

By M. H. Schussler

Minneapolis, Minn.

This district includes Minnesota, Wisconsin, Iowa, North Dakota, South Dakota and Nebraska, of which Wisconsin and Minnesota are the only states which produce any number of ties. The production in these two states for the winter of 1925-1926 will be considerably less than last year. The production of soft wood ties, viz.: tamarac, cedar and hemlock, will be lighter than for any year in the past few years, but hardwood ties are in better demand, and the production will be greater than last year.

This district has always produced a large number of tamarac and cedar ties from timber eight inches in diameter at the top, which of course makes a tie somewhat under the No. 1 grade. The railroads in this territory have tried to absorb these ties in the past, but owing to the fact that they are using heavier equipment, they can no longer use as many of the under-size ties as they previously did, so the demand for these ties is growing less each year. Neither can the traction lines absorb all of this production, so it has got to the point where the production of ties in this district will have to be confined largely to the larger ties. There has been a tendency on the part of the railroads to encourage the production of hardwood ties on account of their being able to obtain larger ties than in the soft woods. Many of the railroads are demanding larger percentages of No. 4 and No. 5 ties, and they want the No. 5 ties manufactured into 8-ft. 6-in. lengths only.

The railroads in this district are buying approximately the same number of ties as last year, increasing their purchases of hardwood and decreasing their purchases of soft wood. Last year's purchases, however, were less than normal, so the demand will not be as large as the dealers expected. The tie market for soft wood ties is far from satisfactory, but the hardwood ties are in good demand, and prices on the No. 4 and No. 5 grades especially, are considered very satisfactory.

The small tie producers in this section are mostly of limited financial resources and must have the assistance of either the railroads or the larger dealers before they can produce—consequently there will not be as many total ties produced this year as last. The larger dealers that are able to produce without the financial assistance of the railroads are proceeding cautiously, and even though the railroads should come into the market during the next 30 days, the production this winter is bound to be light, as it would be too late to stimulate production very much. Taking it all in all there will be a light crop of ties produced in this district in the immediate future.

The tie industry in this district is somewhat affected by the other commodities handled by the same men, such as pulpwood, poles and posts, the demand for which is very light. As a matter of fact, there is practically no demand for fence posts, and pulpwood does not sell easily this year. These two factors will cut down the tie production, even if the railroads should come into the market and offer better prices than they are now paying.

The weather conditions in this district are satisfactory for producing, but owing to the conditions heretofore, mentioned, this will cut no figure with the tie production this year. There is plenty of labor, and the material could be produced if the demand was sufficient.

With reference to stocks on hand, more than a normal stock of ties was carried over from last year, and until this stock is cleaned up, the producers do not feel warranted in putting in additional heavy stock and taking the chance on the future market.

It is hard to predict the future of the tie industry in this district, as most of the dealers thought this undoubtedly would be a good year, owing to the fact that crops in this northwest section of the country were very satisfactory last year. Prices for farm products were satisfactory, and the territory generally is more prosperous than it has been for a period of years. All of these things, it was thought by the tie producers, would have a tendency to stimulate not only the tie industry, but other timber products as well, but we are in the middle of the tie producing season without the demand which was expected.

The amount of standing timber in this district is being reduced continually, and there is a tendency among the producers which own their own stumpage to conserve their standing timber and wait until prices are such that they can realize a profit by manufacturing their

own timber, so what ties are produced this year will be largely from settlers who still have small amounts of timber left or timber from lands on which timber permits are expiring, which will compel some producers to operate.

Generally speaking, the production in this territory will be approximately 25 per cent less than last year and last year's production was less than normal.

Produce Only on Orders on the Pacific Coast

By E. H. Meyer

Vice-President and General Manager, the Chas. R. McCormick Lumber Company, Portland, Oregon

Ties have little to give them any commercial distinction from other kinds of so-called cutting or timber business on the Pacific Coast. At no place in either Oregon or Washington can a mill be found of any capacity that cuts nothing but ties. The larger mills never cut ties unless on an order which permits loading direct from the saw onto the car or cargo dock so that the stocks on hand unsold are always confined to the small accumulations of ordinary No. 1 common of 6-in. by 8 in. by 8-ft. and 7-in. by 8-in. by 8-ft. sizes that the little mills cut out of logs that will make nothing else conveniently.

Since the war many of the larger railroads that serve the Northwestern mills have raised the standards for their ties to the point where, due largely to grades which make it impossible to cut them from second growth timber, the small mill is eliminated. The exacting grades, and in some cases the odd sizes, have naturally brought a much better price than the ordinary No. 1 common 6-in. by 8-in. and 7-in. by 8-in. ties.

The elevation of tie standards, together with a dearth of satisfactory timber cutting for the larger mills, has caused the plants that cut from 10,000 to 20,000 ft. per day to turn to bridge plank and long dimension sticks, which their timber will make, and which bring them more money than ties. They do, however, saw a 6-in. by 8-in. or 7-in. by 8-in. tie when the log will make nothing else advantageously, and unfortunately during the past year the accumulation of these sizes, while at no time great, has been sufficient to permit the buyers to name their own prices and they have not been overgenerous.

With the larger inland mills the special specification tie business during the past year has proved a blessing, as they have been able to secure it in fairly large blocks that assured them cutting at a time when they would have been greatly inconvenienced otherwise for the lack of it.

A much greater variety of sizes is now called for than in former years. The western roads, which are by far the heaviest users of fir trees, are buying mostly 7-in. by 8-in. by 8-ft., 7-in. by 9-in. by 8-ft., and 7-in. by 10-in. by 8-ft. sizes. Some lines buy more than one size, using lighter ties on the side tracks than on the main lines. During the past year a considerable quantity of ties moved to the Atlantic coast by water. Some of this business went in 6-in. by 8-in. by 8-ft. and 7-in. by 8-in. by 8-ft. sizes, but the largest part of it was in 5-in. by 9-in. by 8-ft. and 7-in. by 8-in. by 8-ft. 6-in. and 7-in. by 9-in. by 8-ft. 6-in. dimensions. Export orders call for a larger variety of sizes than domestic business, such as 6-in. by 9-in. by 8-ft., 5-in. by 10-in. by 8-ft. 6-in. or 9-ft., 6-in. by 8-in. by 9-ft., 6-in. by 10-in. by 9-ft., and 5½-in. by 8-in. by 7-ft. Due to the great variety of sizes, it can readily be seen that it is impractical for any one to cut or store ties without orders on the Pacific coast.

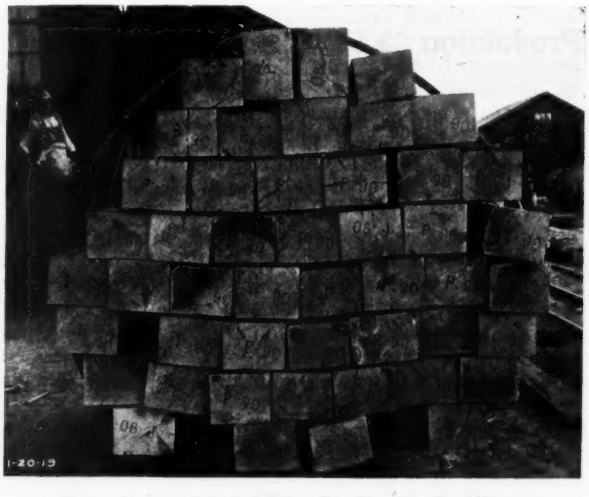
Of the ties used in this country an increasingly large number are being treated. One of the Northwestern roads is equipped to creosote all the ties it purchases, and two of the Southwestern roads are equipped to treat their entire requirements.

The year 1925 did not see a heavy footage of ties shipped to the export markets from Oregon and Washington. China took a fair supply and there were scattered orders for small quantities to other markets, but the bulk of the fir ties moving offshore from the Pacific coast were cut by Canadian mills. As no definite figures appear to be obtainable that separate ties from other kinds of export timber products, it is not practical to attempt to say just what the tie footage moving from British Columbia was, but it is estimated to be about 25 to 30 million feet, divided about evenly between Egypt and the United Kingdom, with India and Mauritius taking approximately 4,000,000 ft. combined. While the call for treated ties in the export markets last year was disappointing, it is said that the outlook is good for the creosoting plants for business from this source in 1926.

Ties on hand mean nothing on the Pacific coast as the ability of the mills to furnish this important item is capable of great expansion and is regulated only by price and the consequent desirability of ties as cutting business. When the larger mills can get timber orders, especially those calling for the regular export or domestic structural grades, they will not consider tie business unless there is a sufficient difference in the price to make it worth while.

Manufacturing ties in the Northwest is not a business by itself. It is merely an item of the general run of cutting and has its ups and downs along with the general market, allowance being made only for the peculiarities of grade and dimensions.

The average prices paid for ties during 1925 were about the same as the prices ruling during 1924, as follows: No. 1 common grade 6-in. by 8-in. by 8-ft., 7-in. by 8-in. by 8-ft., and 7-in. by 9-in. by 8-ft., ranging from $14 to $17 per thousand feet b. m. On special grades similar to that used by the U. S. Railroad Administration during the war, prices ranged from $18 to $21, with the price of $19 prevailing most of the year.



A Tram Load of Good Ties Ready for the Treating Cylinder

What's the Answer?

What Our Readers Have to Say on Current Questions That Perplex Those Engaged in Maintaining Tracks, Structures and Water Supply Facilities

QUESTIONS TO BE ANSWERED IN THE APRIL ISSUE

1. *What causes putty to check and crumble on window sash and how may it be prevented?*

2. *Is it practicable to fix the interval between the shoppings of motor cars? If so what should be the interval be and on what does it depend?*

3. *To what extent is it desirable or advisable to encourage section forces to widen the embankments on their sections to the roadbed standards by the means at their disposal?*

4. *What information should be obtained with regard to the foundation conditions at the site of a new bridge or a small waterway and how should it be obtained?*

5. *Under what conditions is the automatic control of electrically operated pumping stations feasible?*

6. *What character of injury to the base of a rail is to be considered as requiring its replacement?*

7. *Is the preservative treatment of ties for use on steel bridges justified?*

8. *Is it desirable to bolt the heel of a switch through the stock rail or should the stock rail be left free to creep?*

Are Flangeways Necessary?

Are flangeway guards necessary in bituminous highway crossings? If so, to what extent should they be used? Should they be used on skew crossings only or on all crossings?

Not Necessary in All Cases

By P. J. McAndrews
Roadmaster, Chicago & North Western, Sterling, Ill.

Flangeways are not necessary in bituminous crossings, as a general proposition. In my judgment flangeways should be provided at skew crossings where highway traffic is heavy. We have a number of skew crossings with ordinary highway traffic, where the crossing material holds in place very well without the use of inside planks to provide flangeways.

I believe that the bituminous material will hold better along the rail if flangeways are provided at heavy highway traffic crossings, whether on a skew or at a right angle. We have found by using a double layer of planks of suitable thickness and as narrow as six inches, with the bottom plank fitted under the head of the rail, and the flangeway waterproofed by the use of asphalt or other bituminous fillers, that we have been able to keep moisture out of the crossing and hold the crossing material firmly.

Flangeways Reduce Maintenance

By W. M. Anderson
Roadmaster, Seaboard Air Line, Birmingham, Ala.

It is my opinion that a flangeway guard is very necessary in bituminous crossings. This opinion was formed after inspecting a number of crossings that were installed both with and without flangeway guards. The bituminous material will begin to disintegrate in the flangeway and unless some guard is used as a protection, maintenance becomes necessary after three or four months, depending on the amount of traffic. It is practically impossible to keep the flangeway clean of foreign matter such as sand, rock, snow, ice, etc., and the grinding of such matter into the flangeway results in loosening the paving materials at the point and failure occurs in a short time. It is true that the average bituminous crossing is easy to repair but if a suitable inexpensive flangeway guard is used a great amount of petty maintenance can be eliminated. This is true of all crossings whether skew or not. The problem is slightly more serious on skew crossings but I have found through experience that more favorable results are obtained on all crossings if a flangeway is provided.

I have been using a flangeway guard which was called to my attention about a year ago and the results I have obtained are indeed gratifying. This guard is made principally of asphalt and rag felt and is preformed to fit the rail. It is much cheaper than any other guard I know of and is more satisfactory. It is tough enough to fracture slag ballast and will stand a surprising amount of abuse. It also has good insulating qualities which I have found desirable where a track circuit is carried through a grade crossing.

An Objection to the Use of Rails to Form Flangeways

By L. Flynn
Yard Foreman, Galveston, Harrisburg & San Antonio, El Paso, Tex.

I am not in favor of using rails to provide flangeways through highway crossings of any material, but especially so when they are of other than loose material. My reasons for this objection are based on experience and observation. Where rails are used in crossings for this purpose, I find that in time (the length of time depends on the amount of rail traffic) the running rails settle down leaving the guard or flangeway rails high. This,

of course, necessitates tearing up the crossing so as to adze the ties in order to let the flangeway rails down on a level with the running rails. Otherwise the flangeway rails not only make a rough crossing for vehicles, but they also become dangerous to railway traffic.

For this reason I think some other form of flangeway should be provided. If a special form of grooved rail suitable for steam road conditions could be developed this would serve better than any other type. Such rails should be furnished in sufficient lengths to keep joints outside of the crossing.

Returning Cement Sacks

How should empty sacks be cared for and prepared for shipment to the mills and what measures should be taken to insure that this is done on small concrete jobs?

It is Largely Up to the Foreman

By T. H. Strate
Engineer Track Elevation, Chicago, Milwaukee & St. Paul, Chicago

The handling of empty cement sacks on the ordinary maintenance job is almost entirely dependent on the foreman. Instructions in effect on the St. Paul are that each foreman send his empty cement sacks to the local storekeeper on the division, who in turn forwards them to either Tomah, Wis., or Marion, Iowa, where they are shaken out and then sorted and baled. This plan works out satisfactorily but it requires more or less effort on the part of everyone concerned to see that the sacks are not used for miscellaneous purposes. It is also important to see that the foreman takes care of the cement properly before it is used so that the sacks are kept dry.

It would seem to me that the ultimate solution of this question is going to be the use of paper bags. As far as the small jobs are concerned, this would in my opinion, be the ideal way to handle cement.

Frequent Check by the Supervisor Is Necessary

By F. H. Cramer
Assistant Bridge Engineer, Chicago, Burlington & Quincy, Chicago

Our requirements for all types of structures both bridges and buildings run between 600,000 to 800,000 sacks of cement a year. With this large amount required it is sometimes economical to purchase the cement during the early part of the year and store it at various points in waterproof sheds. As work is undertaken during the year the cement is shipped out by the store department on request of the departments handling construction work. During some years only a small amount is stored and the rest shipped direct from the mills to the work. The amount of cement stored depends on market conditions. On railroad construction work there are many jobs requiring only a small amount of cement which must be shipped out of storage, and a few where large amounts are required which can be shipped from storage or direct from the mills. Buying cement in advance and storing necessitates extra handling and without due care with every handling there will be a large percentage of loss or damage to sacks. Our experience has been that some sacks are received in such condition that if not handled with great care they will become damaged and will not be accepted when returned to the manufacturer due to wear through continued service. Instructions are issued to all foremen handling cement sacks as follows:

"Proper care of cloth sacks keeps the cost of cement down. A careless user costs money. There are several reasons that make cloth sacks useless. Sacks should not be allowed to get wet. Do not drop full sacks of cement when handling them from the cement shed to the concrete mixer. Do not use empty sacks for other purposes. Every sack that is damaged costs the company ten cents. Every foreman must exercise every effort to keep the loss on empty cement sacks down to the minimum. Empty cement sacks shall be sorted and tied in neat bundles of 25 and 50, and the sacks of each manufacturer being kept separate and loaded on cars."

Our practice has been to have each supervisory officer, who comes in contact with each job make a special point to ascertain the care given the sacks and exercise the necessary discipline to insure proper handling.

It is my opinion that a personal visit with each foreman from time to time will get better results toward economizing in cement sacks than any set of instructions issued in writing. By this method our percentage of loss has been kept down to the absolute minimum which may vary from five to eight per cent.

Using Salt on Switches

Is it advisable to use salt to prevent the accumulation of ice around switches, interlocking plants and other points in the track?

It Causes Corrosion

By John Evans
Division Engineer, Michigan Central, Detroit, Mich.

Salt should be used at interlocking switches only when its use is the only adequate means available for keeping switches in condition for operation. In such cases the quantity used should be the least necessary, and, as soon as possible after the emergency requiring the use of salt is over, the surfaces on which it has been put should be cleaned to remove any salt remaining as well as the brine and scale formed by it.

The use of salt at interlocked switches is apt to result in corrosion of the threads on bolts and screws used in making adjustments. Furthermore, the scale which is formed by the salt interferes with the action of the oil used for lubrication.

Damage done by salt to non-interlocking switches is not serious in comparison with the help which its use gives in reducing the work necessary to keep switches in working order.

Is of Value Under Certain Conditions

By E. D. Swift
Engineer Maintenance of Way, Belt Railway of Chicago, Chicago

If troublesome accumulations of ice may be prevented by the use of salt I see nothing inadvisable in its use. But I suspect in the usual situation of ice formation that the water which causes the ice has sufficient flow to prevent a concentrated application of salt, and a very strong brine is necessary to accomplish much melting.

Under certain conditions of weather salt may be used effectively as an aid in keeping switches free of falling snow. These conditions are most favorable when the temperature is high enough to induce free moisture in the snow and when there is little or no drifting. In such circumstances enough snow can be melted from the plates and tops of ties between the points and stock rail by liberally sprinkling these surfaces with salt as to reduce considerably the need for sweeping or other manual means for removing snow. The efficacy of salt decreases with lowering temperatures due to lessening free moisture in the snow for the formation of brine. Drift-

ing winds are also unfavorable for the use of salt. At best salt is but a help and then only under certain conditions favorable to its use.

Objection is raised at times to the use of salt in interlocking plants, due principally to the belief that its corrosive effects are detrimental to interlocking equipment. Unquestionably salt brine has a corrosive effect on practically all metal apparatus used in tracks, but it is open to question whether the amount of salt used in salting switches adds measurably to the brine that normally comes onto the tracks through refrigerator car drippings, and if so whether its effect may not be offset by a liberal use of oil to the parts exposed. A good grade of salt for switches is that known as Rock C. C.

How to Repaint Old Brick Walls

When repainting the walls of an old brick building what can be done to obtain an attractive appearance?

Many Pleasing Effects Are Possible

By B. E. Miller
Master Painter, Delaware, Lackawanna & Western, Kingsland, N. J.

Brick walls may be painted in a variety of ways, the treatment depending upon the effect desired, surrounding objects, adjacent buildings, etc. Almost any of the standard high priced pressed bricks may be imitated by spotting-in with various colors in imitation of the mottled effect bricks of this character provide. When doing a job of this kind it is obviously necessary to stripe or line off in imitation of mortar joints. This may also be done in any desired color, black and white being most frequently used.

Very often brick walls are painted in imitation of the different kinds of bricks, the last color applied being flat or lustreless. This hides all unevenness more or less, and presents a soft pleasing appearance. Frequently brick walls are painted with various colors to harmonize with the surroundings or adjacent parts of buildings. They are usually mixed to dry with a gloss by using boiled or raw linseed oil as a vehicle in mixing the paint.

No hard and fast rule may be set down for painting brick walls and the taste of the architect or painter must be relied upon for producing pleasing and attractive appearances.

Lehigh Valley Method Is Effective

By F. N. Laughnan
Division Engineer, Lehigh Valley, Wilkes-Barre, Pa.

When repainting the walls of an old brick building we apply to the brick work a coat of Venetian red mixed with oil, adding sufficient lighter color to make the desired shade. When dry we use two shades of burnt umber color and spot about ten per cent of the brick at random with these two colors. We then line up the mortar joints with a color to represent mortar and all the painting is done in a sort of irregular way to represent newly laid brick work instead of regular designed painting. In the performance of this work a paint spraying machine is utilized in applying the body coat, by which method the work is accomplished much quicker and with a minimum labor cost.

An old brick building repainted by this method becomes very attractive, and in fact, has the appearance of a new structure. Our Wilkes-Barre station which was painted along these lines this year has become the object of favorable comment by city authorities and the public in general. Since the completion of this job the change in the appearance of the building was so striking that several local contractors and builders have approached us asking for the formula and manner in which the work was done, and some of them have already started to repaint old brick buildings on similar lines.

Slaked Lime and Unslaked Lime

What are the relative merits of slaked and unslaked lime for water treatment?

The Advantages of Slaked Lime

By R. C. Bardwell
Superintendent Water Supply, Chesapeake & Ohio, Richmond, Va.

The only possible advantage of unslaked lime over hydrated lime when used for water treatment on railways, is the smaller cost for the higher active chemical content in the initial material. However, the many disadvantages of unslaked lime have warranted its replacement with hydrated lime at a large majority of water treating plants in railway service. The following is an enumeration of the advantages of hydrated lime:—

1. Convenience in handling and transferring.—Unslaked lime rapidly deteriorates when exposed to moisture or carbon dioxide in the air. It is usually furnished in bulk or in large wooden barrels while hydrated lime is supplied in 50 lb. sacks which can be conveniently handled and stored.
2. Where hydrated lime is used, the expense and space requirements of slaking equipment are avoided.
3. Where unslaked lime is used, it is advisable to install air proof storage facilities. With hydrated lime, this expense is advoided.
4. The hydrated lime has a more uniform strength and is therefore more reliable in its chemical application.
5. Even with poor storage facilities, the hydrated lime retains its strength much better than unslaked lime in the air proof vaults.
6. With hydrated lime there are smaller amounts of grit and impurities and better results are obtained from chemical pumps and check valves.
7. With hydrated lime the nuisance from steam generated by slaking is avoided.

Unslaked Lime Is Cheaper

By O. T. Rees
Chief Chemist, Atchison, Topeka & Santa Fe, Topeka, Kan.

In treating with lime and soda ash there are two forms of lime to be taken into consideration—quick lime and hydrated lime. Before there can be any reaction the lime must be in the hydrated state. Our plants are designed to take the lime as it comes from the kiln—as quick lime—store it in bins well protected against the free access of air, and slack it as it is needed, utilizing the heat generated in the slacking process for dissolving the soda ash. Many of the plants now being designed use the hydrated lime which is now a stable commercial product. It has been slacked at the kiln with sufficient water added, to render the product turned out a fine, light powdery form that will readily mix with more water, but without any generation of heat. This material is handled in paper bags and will keep almost indefinitely without deterioration.

The lime in this state is very desirable at plants where small amounts of it are used and where weather conditions are such that the ordinary quick lime air-slack rapidly. If quick lime is used under these conditions its strength is quite an uncertain factor and satisfactory

treatment is a difficult problem for the average water treater.

It would seem advisable also to say something of the relative cost of the two forms of lime. In buying quick lime there are almost certain to be unburned cores, dirt, chirt, sand, etc., present, and under the best of conditions there will be some air-slacking and waste in handling. Our experience has taught us that we can normally expect 10 per cent of the lime to have no reacting value.

On the other hand, hydrated lime is practically pure. It is a uniform product, providing that hydration has progressed uniformily. For comparison we will assume that the hydrated product is fully hydrated and free from impurities, in which case 74 lb. of the material is required to give the same reaction as 56 lb. of the chemically pure quick lime, or 62 lb. of lime 90 per cent pure. Then, for each 100 lb. of ordinary quick lime costing around 56 cents we would have to use 119.3 lb. of hydrated lime at 81 cents per 100 lb., or 97 cents worth, which is 173 per cent of the cost of quick lime.

The tonnage of the chemical transportation would be increased by the use of hydrated lime from 20 to 25 per cent, with an increase in cost and apparently no better treatment. As a general proposition, therefore, we do not feel justified in changing over to the use of hydrated lime exclusively. But, as stated before, at some of the smaller plants we have found the change profitable from the standpoint of results if not from cost.

Getting Paint Under the Ties

What arrangements should be made to paint the tops of steel stringers or deck girders where they are covered by the ties?

Jack Up the Track

By C. Ettinger

Supervisor Bridges and Building, Illinois Central, Chicago

In my opinion it is poor practice to neglect the painting of the portions of girders or stringers which are covered by the bridge ties on account of the difficulty and expense of getting the ties out of the way so that the surface may be painted. It is my experience that these steel surfaces are particularly susceptible to rust because of the moisture retained by the wood.

On the Illinois Central it is a regular practice to have some bridge carpenters accompany the paint gang to the bridge for the purpose of jacking up the deck so as to clear the entire top flanges of the stringers or girders for painting. A lift of about six inches is usually enough to permit the satisfactory cleaning of the metal surface and to do the painting with a side-swipe brush. The paint used for this purpose should be heavier than that ordinarily used because of the tendency of the paint to squeeze out under the pressure applied by the ties.

Apply Paint When Renewing Ties

By Bridge Engineer

We do not ordinarily require paint gangs to disturb the ties when painting the floors of bridges or the tops of deck girders. However, bridge gangs are expected to paint the top flanges as they are uncovered in renewing the deck. It is our experience that under ordinary circumstances this arrangement will be effective in protecting the bridge steel. However, where the bridge is exposed to brine drippings from a heavy refrigerator traffic, the problem of protecting the tops of bridge floors is a serious matter regardless of whether the metal is covered by the ties or not. We have made extensive trials with various coatings in an effort to discover an effective protection against brine and it is our experience that heavy oils serve this purpose better than any other material which we have tried. We apply the oil in heavy coatings and have found that it spreads under the ties and thus affords a reasonable degree of protection to the portion of the steel covered by them.

A Question on Winter Rail Laying

When about to lay rail in the winter, what measures should be taken to prevent the accumulation of snow, ice and frozen dirt on the rails and fastenings? What measures should be taken to remove that which has accumulated?

No satisfactory answer can be given to this question because there is none. If the weather is cold and dry from the time the rail is unloaded until it is laid up no particular trouble from this cause should be experienced. It is also reduced to a minimum where rail is laid in track on clean rock ballast. But if rail is unloaded when the temperature is above freezing, or there is a thaw followed by a freeze after the rail is unloaded, ballast or dirt and ice is almost certain to stick to the rail. About the only precaution that can be taken is to lay the rails on their side with the idea of keeping the under side of the base as clean as possible.

Likewise, there is no simple means of removing ice or other frozen material from the rail, notwithstanding the fact that it is just as important to have the rail clean as it is to have the tops of the ties and tie plates clean before the rails are set into place. Some of this frozen material may be removed from the rail by tapping it with a maul or by lifting one end of the rail up and dropping it.

One road reports that it has used steam jets for this purpose, but suggests it purely as an emergency method because it entails an expense which will add materially to the cost of the rail laying work. It is the experience on this road that when rail has become badly coated with frozen material it is better to postpone the work until conditions are more favorable unless an emergency such as the presence of damaged rail in the track makes the immediate renewal imperative.—Editor.

When Is a Lookout Man Necessary?

What conditions of traffic make the employment of a lookout man necessary to protect men in a track gang from being hit by trains or engines?

No Specific Answer Is Possible

By Maintenance Officer

Rule 203 governing employees working on or about tracks, which forms a part of the manual of rules for the guidance of employees of the maintenance of way department adopted by the American Railway Engineering Association is as follows: "Foremen or others in charge of employees working on or about the tracks must expect their men to be alert and watchful and to keep out of danger and will take the necessary precautions to see that all men working under their immediate supervision receive warning of approaching trains in time to reach a place of safety."

I question whether it would be possible to develop a rule expressed in less general terms than this one because the nature of the protection which must be provided for the men will vary with the speed of the train, the interval between trains, the alinement of the track and to a certain measure at least, the number of tracks. Where trains are run at high speed the fulfillment of the

foreman's responsibility for the safety of his men will ordinarily require that he himself keep a careful lookout. On some lines it is customary to employ an assistant foreman who personally directs the men while the foreman stations himself so that he can supervise the work and also be on the lookout for trains. Where conditions are such as, for example, on curves in cuts or where the view is otherwise obstructed, and an effective lookout can be maintained only by taking a station at some distance from the gang, it is better for the foreman to select some member of the gang to serve as a lookout so that he himself can more properly direct the work of the gang. Under certain conditions it is probably best to assign one man to this duty regularly regardless of the point on the section where the gang may be at work.

While the necessity for a lookout man depends upon the conditions, and the responsibility for the safety of the men is largely imposed on the foreman, it is a responsibility which his superior officers must share with him. In consequence it is the duty of the supervisory or division officers to give the foreman definite authority to employ a lookout man where, in their opinion, conditions justify the assignment of a man to this duty

Local Conditions Determine the Necessity for a Watchman

By T. F. Donahoe

General Supervisor of Road, Baltimore & Ohio, Pittsburgh, Pa.

Small gangs of experienced men seldom require a lookout as the foreman can usually exercise the necessary precautions for the safety of the men. On heavy curves where the hillside obstructs the view for any distance it is often necessary to station a man around the curve to give a whistle warning on the approach of a train. On lines having four or more running tracks it is often necessary to assign two experienced men to serve as lookouts, keeping them as close to the gang as it is possible under the local conditions to insure that the lookout men will be enabled to give the men in the gang warning in ample time to get in the clear.

When the gang is working in a hump classification yard it is well to have a man to warn the gang when a cut of cars is approaching on the track on which the gang is at work. Whenever it is necessary to clean switches in an interlocking plant or a large yard the best practice is to work the men in pairs, at least one man in each pair to be an experienced employee who knows what precautions it is necessary to take in keeping a lookout for trains or engine movements.

Work in tunnels requires special precautions to insure the safety of the men. A lookout man should be stationed in the tunnel at some distance in each direction from where the gang is at work. These men being instructed to give a shrill whistle whenever a train is approaching, one whistle signal being given for a train approaching from one direction and another signal for trains from the opposite direction, such signals to be given in ample time for the men to get in the clear. They should remain in the clear until the train has left the tunnel. When gangs are working at the ends of tunnels it is also necessary to place a man in the tunnel to warn the gang whenever a train is about to pass out of the tunnel portal.

On long bridges not provided with walks and having small refuge bays some distance apart, it is often necessary to put out a man with a flag as well as a whistle and issue a "19" order to all trains to whistle a warning and give the men ample time to get in the clear.

With the Associations

The American Railway Engineering Association

The following is a list of the nominees for office and membership of the board of directors and the Nominating Committee, upon which action will be taken by letter ballot before the date of the convention.

For president, C. F. Felt, chief engineer system, Atchison, Topeka & Santa Fe.

For vice-president (one to be elected), W. D. Faucette, chief engineer, Seaboard Air Line; E. B. Katte, chief engineer electric traction, New York Central.

Secretary, E. H. Fritch.

Treasurer, G. H. Bremner.

Directors (three to be elected), L. W. Baldwin, president, Missouri Pacific; J. B. Hanna, chief engineer, Kansas City Terminal; W. T. Dorrance, designing engineer, New York, New Haven & Hartford; R. H. Ford, assistant chief engineer, Chicago, Rock Island & Pacific; F. W. Green, vice-president, St. Louis Southwestern; W. K. Hatt, head, School of Engineering, Purdue University; Frank Lee, engineer maintenance of way, Canadian Pacific; B. R. Leffler, engineer of bridges, New York Central and C. H. Stein, general manager, Central Railroad Company of New Jersey.

Nominating committee (five to be elected), L. B. Allen, superintendent maintenance of way, Chesapeake & Ohio; C. W. Baldridge, assistant engineer, Atchison, Topeka & Santa Fe; W. H. Hoyt, chief engineer, Duluth, Missabe & Northern; F. R. Layng, engineer of track, Bessemer & Lake Erie; E. R. Lewis, principal assistant engineer, Michigan Central; B. H. Mann, signal engineer, Missouri Pacific; F. E. Morrow, assistant chief engineer, Chicago & Western Indiana; J. W. Orrock, engineer of buildings, Canadian Pacific; H. J. Pfeifer, chief engineer, Terminal Railroad Association of St. Louis, and A. F. Robinson, bridge engineer, system, Atchison, Topeka & Santa Fe.

The Bridge and Building Association

Owing to inability to secure adequate hotel accommodations on the date on which it regularly holds its convention, the American Railway Bridge and Building Association has been forced to set its convention ahead one week. It will, therefore, meet at the Hotel Jefferson, Richmond, Va., on Ooctober 12, 13 and 14.

Committees have been selected to study and report upon subjects at the next convention as follows:

The Use of Motor Cars by Bridge and Building Gangs: V. E. Engman, chief carpenter, C. M. & St. P., Terre Haute, Ind., (chairman); H. H. Eggleston supervisor bridges and buildings, C. G. W., Des Moines, Iowa, (vice-chairman); G. W. Koontz, division engineer, St. L.-S. F. Ft. Worth, Tex.; W. F. Martens, assistant general foreman, A. T. & S. F., Winslow, Ariz.; B. F. Gehr, master carpenter, Penna. Richmond, Ind.; T. B. Turnbull, superintendent bridges and buildings, Ann Arbor, Owosso, Mich.; T. N. Heron, assistant engineer, A. & V., Vicksburg, Miss., and G. L. Sitton, engineer maintenance of way, Southern, Danville, Va.

The Use of Creosoted Timber, including the Selection of Woods Best Adapted to Treatment: C. S. Heritage, bridge engineer, K. C. S., Kansas City, Mo., (chairman); W. A. Clark, chief engineer, D. & I. R., Duluth, Minn. (vice-chairman); D. T. Rintoul, general bridge inspector, S. P., San Francisco, Cal.; J. E. Coffin, timber expert, Southern, Winston-Salem, N. C.; I. L. Simmons, bridge engineer, C. R. I. & P., Chicago; F. J. Pitcher, assistant engineer, structures, N. Y., N. H. & H., New Haven, Conn., and A. J. James, general foreman, bridges and buildings, A. T. & S. F., Topeka, Kan.

The Application of Protective Coatings to Structural Steel: C. U. Smith, district engineer, C. M. & St. P., Milwaukee, Wis., (chairman); H. H. Harman, engineer of bridges, B. & L. E., Greenville, Pa., (vice-chairman); H. B. Stuart, bridge engineer, G. T., Toronto, Ont.; Martin Kane, building superintendent, D. & H., Albany, N. Y.; J. D. Voorheis, assistant engineer, Wabash, Peru, Ind.; J. P. Smallenberger, master carpenter, Erie, Meadville, Pa.; G. J. Klumpp, supervisor bridges and buildings, N. Y. C., Rochester, N. Y., and R. W. Johnson, assistant engineer, C. M. & St. P., Chicago.

Relative Merits of Different Kinds of Roofing Material for Different Types of Railroad Buildings: K. Peabody, general supervisor buildings, N. Y. C., New York, (chairman); L. P. Kimball, engineer buildings, B. & O., Baltimore, Md., (vice-chairman); J. C. Crawford, division engineer, D. & R. G. W., Salt Lake City, Utah; E. P. Self, supervisor buildings, L. I., Jamaica, N. Y.; P. Aagaard, general building inspector, I. C., Chicago; F. O. Condon, engineer maintenance of way, C. N., Moncton, N. B.; H. I. Benjamin, assistant division engineer, S. P., Portland, Ore., and John Harden, M. C., Detroit, Mich.

The Use of Compressed Air on Bridge and Building Work: F. A. Dever, division engineer, Penna., Pittsburgh, Pa., (chairman); William Shively, master of bridges, C. R. R. of N. J., Jersey City, N. J., (vice-chairman); G. E. Bitz, supervisor of bridges, N. Y. C., Cleveland, Ohio; Albert Fink, general foreman bridges and buildings, D. L. & W., Buffalo, N. Y.; Adolph Yappen, assistant engineer bridge maintenance, C. M. & St. P., Chicago; J. W. Holcomb, supervisor bridges and buildings, L. V., Buffalo, N. Y., and A. B. Scowden, assistant engineer bridges, B. & O., Cincinnati, Ohio.

Methods of Repairing Disintegrated or Poor Concrete: P. G. Lang, Jr., engineer bridges, B. & O., Baltimore, Md., (chairman); R. C. Young, chief engineer, L. S. & I., Marquette, Mich., (vice-chairman); J. S. Robinson, division engineer, C. & N. W., Chicago; P. N. Nelson, supervisor bridges and buildings, S. P., San Francisco, Cal.; Leland Clapper, engineer bridges and buildings, D. & I. R., Two Harbors, Minn.; G. W. Mossgrove, master mason, Penna., Steubenville, Ohio; G. W. Welker, supervisor bridges and buildings, Southern, Alexandria, Va.; E. L. Sinclair, assistant engineer, C. M. & St. P., Marion, Iowa, and Frank Ringer, chief engineer, M-K-T., St. Louis, Mo.

Pumping Equipment for Various Kinds of Service: H. H. Richardson, engineer water service, M. P., St. Louis, Mo., (chairman); R. C. Bardwell, superintendent water service, C. & O., Richmond, Va., (vice-chairman); J. H. Grover, general foreman water service, A. T. & S. F., Barstow, Cal., John Sheldon, master plumber, Erie, Huntington Ind.; L. C. Prunty supervisor general foreman water service, U. P., Kansas City, Mo.; C. J. McCarthy, chief carpenter, C. M. & St. P., Aberdeen, S. D.; John W. Porter, special engineer, C. N., Winnipeg, Man.; M. F. Stoner, assistant engineer, D. & H., Albany, N. Y., and J. B. Duncan, Jr., fuel and water supply supervisor, S. P., Dunsmuir, Cal.

Protecting Structures Over Tracks from Locomotive Gases: F. H. Masters, assistant chief engineer, E. J. & E., Joliet, Ill., (chairman); L. B. Alexander, assistant bridge engineer, M. C., Detroit, Mich., (vice-chairman); P. B. Spencer, engineer structures, N. Y., N. H. & H., New Haven, Conn.; A. E. Bechtelheimer, general bridge inspector, C. & N. W., Chicago; W. L. Smith, bridge engineer, Terminal R. R. Association of St. Louis, St. Louis, Mo.; B. F. Stidfole, master carpenter, Penna., Elizabeth, N. J.; F. E. Schall, bridge engineer, L. V., Bethlehem, Pa., and F. A. Taylor, master carpenter, B. & O., Cumberland, Md.

Directory of Associations

American Railway Bridge and Building Association.—C. A. Lichty, secretary, 319 North Waller avenue, Chicago. Next convention, October 12-14, 1926, Richmond, Va.

American Railway Engineering Association (Works in co-operation with the American Railway Association, Division IV).—E. H. Fritch, secretary, 431 South Dearborn street, Chicago. Next Convention, Congress Hotel, Chicago, March 9-11, 1926.

American Wood Preservers' Association.—E. J. Stocking, secretary, 111 West Washington street, Chicago. Next convention, January, 1927, Nashville, Tenn.

Bridge and Building Supply Men's Association.—B. J. Wilson, Pocket List of Railroad Officials, 605 Fischer Building, Chicago. Annual exhibit at convention of American Railway Bridge and Building Association.

National Association of Railroad Tie Producers.—J. S. Penney, secretary, T. J. Moss Tie Company, St. Louis, Mo. Next convention, January, 1927, Nashville, Tenn.

National Railway Appliances Association.—C. W. Kelly, secretary, Seeberger Building, 845 South Wabash avenue, Chicago. Annual exhibition at convention of American Railway Engineering Association.

Roadmasters' and Maintenance of Way Association.—T. F. Donahoe, secretary, 428 Mansion street, Pittsburgh, Pa. Next convention, September 21-23, 1926, Chicago.

Track Supply Association.—W. C. Kidd, Ramapo-Ajax Corporation, Hillburn, N. Y. Annual Exhibit at convention of Roadmasters' and Maintenance of Way Association.

The Material Market

THE MATERIAL MARKET during the month of January may be characterized as one devoid of any marked trends and without any particular changes in either demand or price levels from those prevailing during the preceding month. While prices have remained stable with almost no changes, there is a certain undercurrent of weakness. But this is believed to be only a temporary condition because it does not coincide with the anticipated prospect of large production in industry during the coming year. It is explained further by the fact that no matter what production plans are in the various industries the possibility of obtaining prompt deliveries has caused manufacturers generally to figure on a much smaller interval between purchase of material and its use in manufacture than was the case for many years in the past.

PRICES PER 100 LB.

	Pittsburgh December	Chicago December	Pittsburgh January	Chicago January
Track spikes	$2.80 to $3.10	$2.80 to $3.10	$2.80 to $3.10	$2.90 to $3.00
Track bolts	3.90 to 4.25	3.90 to 4.00	4.00 to 4.25	3.90 to 4.00
Angle bars	.....	2.75	.....	2.75	.....	2.75
Tie plates, steel	2.35 to 2.50	.....	2.35	2.35 to 2.50	.....	2.35
Boat spikes	.....	3.25	.....	3.25	.....	3.25
Plain wire	.....	2.50	.....	2.55	.....	2.50	.....	2.55
Wire nails	.....	2.65	.....	2.70	.....	2.65	.....	2.70
Barb wire, galv.	.....	3.35	.....	3.40	.....	3.35	.....	3.40
C. I. pipe, 6 in. to 12 in., ton	.....	.....	.....	50.20	.....	.....	.....	50.20
Plates	1.90 to 2.00	.....	2.10	1.85 to 1.90	.....	2.10
Shapes	1.90 to 2.10	.....	2.10	1.90 to 2.10	.....	2.10
Bars, soft steel	2.00 to 2.10	.....	2.10	.....	2.00	.....	2.10
Rivets, struct.	.....	2.60	.....	2.75	.....	2.60	.....	2.75
Conc. bars, billet	2.00 to 2.10	.....	.....	2.00 to 2.10	.....	.....
Conc. bars, rail	1.80 to 1.90	2.00 to 2.10	1.80 to 1.90	2.00 to 2.05
Rail, per gross ton, f. o. b. mills	.....	.....	43.00	.....	.....	.....	43.00

The scrap market is quiet and prices have been depressed moderately during the past month.

PRICES PER GROSS TON AT CHICAGO

	December	January
Relaying rails	$26.00 to $31.00	$26.00 to $31.00
Rails for rerolling	18.50 to 19.00	17.50 to 18.00
Rails less than 3 ft. long	19.00 to 19.50	18.50 to 19.00
Frogs and switches cut apart	17.25 to 17.75	17.00 to 17.50
Steel angle bars	18.50 to 19.00	18.00 to 18.50

With January always a quiet month in the lumber market no particular change in the status of the market has occurred. Price levels have been subjected to some variations, both upward and downward, but the average remains much the same.

SOUTHERN PINE MILL PRICES

	December	January
Flooring, 1x4, B and B flat	$49.54	$47.82
Boards, 1x8, No. 1	35.01	35.68
Dimension, 2x4, 16, No. 1, common	28.24	28.33
Dimension, 2x10, No. 1, common	29.15	30.09
Timber, 4x4 to 8x8, No. 1	26 84	28 79
Timbers, 3x12 to 12x12, rough	42.58	42 22

DOUGLAS FIR MILL PRICES

Flooring, 1x4, No. 2, clear flat	$27.00	$27.00
Boards, 1x8, 6 to 20, No. 1, common	15.50	13.50
Dimension, 2x4, No. 1, common	17.00	19.00
Dimension, 2x10, 16, No. 1, common	16.50	18.50
Timbers, 6x6 to 8x8, No. 1, common	21.00	21.00
Timbers, 10x10 to 12x12, rough	18.00	17.00

Prices for Portland cement in carload lots, not including package, as given in the table below, have been subject to no changes from those reported in last month's issue.

New York	$2.15	Minneapolis	$2.32
Pittsburgh	2.09	Dallas	2.05
New Orleans	2.40	Denver	2.84
Chicago	2.10	San Francisco	2.31
Cincinnati	2.37	Montreal	1.80

Railroad News Briefly Told

The Interstate Commerce Commission has postponed the effective date of its second train control order (January 14, 1924), in the cases of the St. Louis-San Francisco and the Central of New Jersey, to July 18.

The St. Louis Southwestern is one of the owners of a new radio broadcasting station at St. Louis known as the "Voice of St. Louis." It is a 5,000 watt installation costing $120,000, and is far more powerful than any station heretofore operating in St. Louis

The Chicago & North Western has carried 132,000,000 passengers during the past four years without loss of any passenger's life in a train accident. The total number of employees killed and injured in 1925 was 21 per cent less than in the preceding year.

The Interstate Commerce Commission has ordered an investigation of the use of private passenger-train cars, including so-called office cars, in the transportation of persons, the order to apply to all Class I, Class II and switching terminal railroads.

Net operating revenues of the Canadian National for the first 11 months of 1925 totaled $26,916,205, as compared with $14,483,968 in the same period of 1924. The net operating revenues of the Canadian Pacific for the first 11 months of 1925 were $35,327,983, as compared with $33,497,940 in 1925.

The fifth annual report of the New York State Public Service Commission contains tables summarizing the records of rail failures in that state during the year ending June 30, 1925. The total number of such failures was 3,040, a slight decrease from the previous year; failures from internal transverse fissures, aggregated 390; an increase of about six per cent over the previous year.

The 34 employees' athletic clubs of the Union Pacific, with a membership of 12,000, have organized the Union Pacific Athletic League, which will direct competitive contests over the system. Under the constitution adopted for this league all athletic activities will be conducted solely for and by employees, but the company will continue to assist by arranging fields, furnishing material and paying part of the time of contestants in system meets.

The Chateau Frontenac, the Canadian Pacific's famous hostelry at Quebec, suffered about $2,000,000 damage in a fire on January 14. The newer section of the structure was not affected and the hotel, restricted to the undamaged portion, was opened again to the public on January 18. Repairs to the damaged wing will be undertaken at once and it is expected that restoration will be complete by summer.

The Minneapolis, St. Paul & Sault Ste. Marie and the Northern Pacific have applied to the Interstate Commerce Commission for permission to consolidate their passenger train service between Minneapolis, Minn., Duluth and Superior, Wis., about 160 miles. The pooling plan is expected to afford a saving of $159,000 a year in the combined operating expenses of the divisions of the two roads which serve Minneapolis, the head of the lakes, and intervening territory. The two railways now operate a total of five trains each way between Minneapolis and Duluth and when the plan is approved two of the trains will be discontinued.

Clains resulting from loss and damage to freight in 1925 were less, when compared with the volume of freight handled, than in any previous year on record. The Freight Claim Division of the American Railway Association reports that the total for the year was about $40,000,000, although more cars were loaded with revenue freight during the year than ever before. The total of damages paid for the year was about 16.75 per cent under 1924 and approximately 19 per cent under 1923. The total paid in 1925 is estimated from actual payments for nine months.

The Bureau of Locomotive Inspection of the Interstate Commerce Commission in 1925 inspected 43,188 locomotives, of which 18,144, or 42 per cent, were found defective and 1,742 were ordered out of service. For the month of December the bureau inspected 5,926 locomotives, of which 2,503, or 42 per cent, were found defective and 230 were ordered out of service.

The Graduate School of Yale University, New Haven, Conn., offers five fellowships in transportation of $1,000 each annually, for advanced work in transportation, and applications will be received by the dean of the school up to April 1. These are the Strathcona Memorial Fellowships, provided for by the will of Lord Strathcona, and preference is to be given to men who, for at least two years have been connected with the railways of the Northwest, or the sons of such men.

Progress is being made on the bill drafted by the National Association of Railway & Utilities Commissioners to regulate interstate commerce by motor vehicles operating as common carriers on the public highways. It was introduced in the Senate by Senator Commins, and was introduced in the House by Representative Parker, chairman of the House committee on interstate and foreign commerce, as H. R. 8266.

The A. B. & A. Railroad Credit Union has been organized by officers and employees of the Atlanta, Birmingham & Atlantic for the benefit of employees of this road. It is an adjunct of the benefit association which was established by these employees about three years ago. This board consists of five members elected by employees and five appointed by the management. The membership of the benefit association at present is 1,700 or 85 per cent of all the persons employed on the road. It has a reserve fund of $41,000. This fund will be taken over by the credit union.

The New England Transportation Company, the bus subsidiary of the New York, New Haven & Hartford, has been granted a permit by the Connecticut Public Utilities Commission to operate buses between New Haven, Conn., and Hartford (approximately 37 miles). This route parallels one of the company's main railway routes and it is understood that the bus service will make possible the elimination of a number of train stops. The area served is densely populated. An independent bus operator sought a permit for the same route but the application was denied.

On January 13th the United States Senate confirmed the appointment of **Richard V. Taylor,** formerly vice-president and general manager of the Mobile & Ohio and now commissioner of the city of Mobile, Ala., as a member of the Interstate Commerce Commission, to succeed **C. C. McChord,** resigned. Commissioner **Joseph B. Eastman** has been unanimously elected chairman of the Interstate Commerce Commission to serve from Janury 1, 1926, for the ensuing year in accordance with the policy adopted in 1911, under which members of the commission served in turn as chairman in the order of seniority.

A contract for the rental of the Moffat railroad tunnel has been entered into by the Denver & Salt Lake which provides for a lease for the next 50 years at an annual rental sufficient to retire and pay interest on two-thirds of

the tunnel bonds. The contract, based on the present outstanding tunnel bonds, aggregating $9,220,000, obligates the railroad to a supplementary payment of $1,000,000 if additional expenditures are necessary to complete the project. The original contract will run for 50 years and will cover the 46-year period during which the bonds will be retired, with a provision that the railroad may have an option for an additional 49 years at the close of the first 50 years.

The New York State Public Service Commission has made a survey of all highway grade crossings in that state, as a result of which it has been found that there are 7,504 crossings of highways with main tracks of railways and that the total cost of eliminating all of them would be approximately $604,000,000. In addition there are 791 crossings of highways with sidings or spurs, making a grand total of 8,295 grade crossings.

The commission has divided the crossings into three classifications: A, B, and C, based on the character of the railroad and of the highway, and the extent of the traffic upon each, Class A crossings being deemed the most important. The three classes appear as follows:

	Crossings	Estimated cost
Class A	1,972	$281,810,000
Class B	2,548	166,760,000
Class C	2,984	155,325,000
	7,504	$603,895,000
Other than main track	791	.....
	8,295	.....

The commission has also prepared statistics on the number of persons killed and injured at grade crossings in New York state in the year ending June 30, 1925, showing that 117 persons were killed and 497 were injured, as compared with 160 killed and 535 injured during the preceding fiscal year.

New Labor Bill Before Congress

A new railway labor bill drafted in accordance with plans agreed upon by representatives of the railroads and railway labor organizations has been introduced in Congress by Chairman Watson of the Senate Committee on Interstate Commerce and by Chairman Parker of the House Committee on Interstate and Foreign Commerce, which has for its purpose the abolition of the United States Railroad Labor Board and the substitution in its place of a new system for the adjustment and settlement of disputes between the railways and their employees. The terms of this bill outline the procedure for the establishment of adjustment boards, a board of mediation, boards of arbitration and boards of investigation.

The boards of adjustment are to be established by agreement between individual carriers and their employees or between regional groups or all the railways as a whole and their employees. These adjustment boards are designed for the settlement of disputes concerning grievances or interpretation or application of existing agreements. The board of mediation is to consist of five members appointed by the President for the purpose of considering disputes submitted by either party to a controversy in case of failure of agreement by any of the adjustment boards, or for the consideration of changes in rates of pay, rules or working conditions not adjusted by conference between parties. Boards of arbitration are to handle disputes where both parties consent to arbitrate, the method of selecting members of the boards being also covered in the bill. A board of investigation is to be appointed by the President in case of failure of agreement through the agency of any of the boards previously mentioned, this board being required to investigate all of the circumstances attending the controversy and submit a report to the President.

While this bill has the endorsement of the railway managements and the brotherhoods some objections have been raised by representatives of shippers because the bill makes no provision for representation on the part of the public in any of the boards to be created by the bill, it being the feeling that this omission leaves the matter entirely in the hands of the railroads and their employees and could easily result in unwarranted wage advancements which the carriers would endeavor to pass on to the public in the form of increased rates.

Personal Mention

General

H. B. Hoyt has been appointed superintendent of the timber preserving plant of the Buffalo, Rochester & Pittsburgh, with headquarters at Bradford, Pa., succeeding **F. M. Pugsley**, who has resigned.

F. C. Paulsen, division engineer on the Union Pacific, with headquarters at Cheyenne, Wyo., has been promoted to assistant superintendent of the Wyoming division, with the same headquarters, succeeding **H. A. Connett**, promoted.

R. C. Miller, whose promotion from division engineer to superintendent of the Schuylkill division of the Pennsylvania with headquarters at Reading, Pa., was reported in the January issue, was born on December 11, 1878, at Zanesville, Ohio, and was graduated from Ohio State University in 1901, with the degree of civil engineer. He entered railway service on May 30, 1901, with the Pennsylvania at Pittsburgh, and from 1901 to 1906, he was with the engineering corps at Zanesville, Ohio, Pittsburgh, Pa., and Columbus, Ohio. In April, 1906, he became assistant division engineer of the Marietta division and in October, 1907, was transferred to the Logansport division, and was again transferred in June, 1908, to the Columbus division. On January 1, 1913, he became division engineer of the Toledo division, and until the time of his recent promotion, was transferred in that position from the Toledo division to the St. Louis division, the Chicago Terminal division, the Philadelphia division, and the New York division.

M. F. Longwill, assistant chief engineer of the Wabash, with headquarters at St. Louis, Mo., has been promoted to assistant to the president of the Wabash, with the same headquarters, to succeed **T. M. Hayes**, retired. Mr. Longwill was born on February 13, 1885, at Indiana, Pa., and graduated at the Ohio Northern University in 1906. He entered railway service in the engineering department of the Missouri Pacific in that year, later holding various engineering positions until 1909, when he was promoted to roadmaster. Mr. Longwill was promoted to assistant engineer in 1911, and held that position until 1915, when he was appointed resident engineer on the Union Railway at Memphis, Tenn. He entered the service of the Wabash in January, 1918, as division engineer, and was promoted to assistant chief engineer in October, 1923. He held that position at the time of his recent promotion to assistant to the president.

R. L. Schmid, division engineer of the Atlanta division of the Nashville, Chattanooga & St. Louis, with headquarters at Atlanta, Ga., has been promoted to assistant to the general manager, with headquarters at Nashville, Tenn. Mr. Schmid was born on March 20, 1886, at Louisville, Ky., and attended the college of engineering of the Kentucky State University from 1907 to 1910. He entered railway service in February, 1906, when he was employed as a rodman on the Louisville & Nashville. He served in the engineering department of the Penn Tunnel & Terminal Railroad in 1909, returning to the engineering department of the Louisville & Nashville in 1910. He entered the service of the Nashville, Chattanooga & St. Louis in 1915 as a pilot on valuation work and was promoted to resident engineer on construction in 1916. He was promoted to assistant engineer with special assignments in 1918 and was promoted to assistant division engineer of the Chattanooga division in 1919. Mr. Schmid was promoted to division engineer of the Atlanta division in 1920 and continued in that capacity until his recent promotion to assistant to the general manager.

Engineering

Michael J. Nugent has been appointed assistant maintenance engineer of the Delaware & Hudson.

Frank C. Shepherd, assistant chief engineer of the Boston & Maine, has been appointed chief construction engineer, and **William J. Backes**, who resigned recently as assistant general manager of the New York, New Haven & Hartford, has

been appointed engineer in charge of maintenance of way. Both appointments are effective February 1.

M. McKimmey has been appointed resident engineer of the Missouri & North Arkansas, with headquarters at Harrison, Ark.

Donald Barrett has been appointed assistant engineer of the Wisconsin division of the Chicago & North Western, with headquarters at Chicago.

F. G. Jonah, assistant to the president and chief engineer of the St. Louis-San Francisco, has had his jurisdiction extended over the Muscle Shoals, Birmingham & Pensacola.

W. H. Lawston has been appointed division engineer on the Union Pacific at Cheyenne, Wyo., succeeding **F. C. Paulsen,** promoted as noted elsewhere.

H. J. Shaw, division engineer of the Akron division of the Pennsylvania, with headquarters at Akron, O., who has been off duty for some time because of ill health, has resumed his duties.

John Lansdale has been appointed valuation engineer and tax commissioner of the Southern Pacific Lines in Texas and Louisiana, the offices and duties of valuation engineer and tax commissioner having been consolidated.

A. S. Butterworth, chief engineer of the Muscle Shoals, Birmingham & Pensacola (now a subsidiary of the St. Louis-San Francisco), has been appointed division engineer, with headquarters at Pensacola, Fla.

H. E. Yeomans, assistant engineer on the Dakota division of the Great Northern, has been promoted to division engineer for the same division in charge of maintenance and engineering, with headquarters at Grand Forks, N. D.

William E. Moran, whose appointment to engineer of fire protection on the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Cincinnati, Ohio, was reported in the November, 1925, issue, was born on April 30, 1888, at Cincinnati, Ohio, and entered the service of the Big Four on January 16, 1913. From that date until November 16, 1917, he was employed as draftsman, on the latter date being promoted to assistant engineer, which position he was holding at the time of his promotion.

G. S. Lovering, assistant engineer of the Minneapolis & St. Louis, with headquarters at Minneapolis, Minn., has been promoted to principal assistant engineer, with the same headquarters, succeeding **R. C. Smith,** who has resigned to become chief engineer of the Minneapolis, Northfield & Southern, with headquarters at Minneapolis, Minn. **F. F. Ellsworth** has been appointed land engineer, succeeding **J. S. McClintock,** who has resigned to accept an appointment in the land appraisal department of the Interstate Commerce Commission.

George Baerthlein has been appointed assistant division engineer on the Eastern division of the New York Central with headquarters at New York City. **George D. Donahue** has been appointed assistant division engineer of the Rochester division, with headquarters at Rochester, N. Y., and **Russell M. Kelly** has been appointed assistant division engineer on the Ontario division, with headquarters at Oswego, N. Y. Mr. Donahue was born at Watertown, N. Y., in July, 1891, and graduated from Ohio State University in 1915. He entered railway service as a transitman on the Rochester division of the New York Central at Rochester, N. Y., in September, 1916, and was promoted to assistant supervisor of track on the main line of the Syracuse division, with headquarters at Rochester. He was holding this position at the time of his promotion to assistant division engineer, with the same headquarters.

J. H. Cooper, supervisor on the Pennsylvania, with headquarters at New York, has been promoted to division engineer of the Monongahela division, with headquarters at Uniontown, Pa., succeeding **R. R. Metheany,** who has been transferred. Mr. Cooper was born at Easton, Pa., on July 5, 1883, and graduated from Lafayette college in 1905. He entered the service of the Pennsylvania in October, 1905, as a rodman, on August 1, 1910, being promoted to transitman at Philadelphia. He was promoted to assistant supervisor at Tyrone, Pa., on January 1, 1911, and held this position at various locations until October 25, 1917, when he became supervisor of track at Phillipsburg, N. J. He was transferred to New York City on March 1, 1920, and was located there at the time of his recent promotion to division engineer. His entire railroad service has been with the Pennsylvania.

A. A. Johnson, track supervisor on the New York Central, who has resigned to become track engineer on the Delaware, Lackawanna & Western, as reported elsewhere in these columns, graduated in Civil engineering from Lafayette college in 1907, and entered railway service in the engineering department of the New York Central at New York City. He was made assistant track supervisor in 1910, and held this position until 1916, when he was made assistant engineer in the maintenance of way department. In 1920 he was promoted to track supervisor at Kingston, N. Y., being later transferred to Albany, N. Y., where he was located at the time of his resignation.

J. P. Anderson, assistant engineer on the Atlanta division of the Nashville, Chattanooga & St. Louis, has been promoted to district engineer of the same division, with headquarters at Atlanta, Ga., succeeding **R. L. Schmid** promoted, as noted elsewhere in this issue. Mr. Anderson was born at Hurricane, Tenn., on December 22, 1888, and attended Brauham and Hughes College from 1903 until 1907. He served as rodman and recorder with the United States Geological Survey until 1909, when he entered railway service as a rodman with the Louisville & Nashville in the office of the assistant engineer at Nashville, Tenn. Two years later he was promoted to instrumentman, with headquarters at Montgomery, Ala., and in 1911 he was transferred to Nashville. In April, 1916, he entered the service of the Nashville, Chattanooga & St. Louis as an assistant engineer on the Chattanooga division and in 1917 was sent to Chattanooga as resident engineer in charge of the revision of yards, construction of shops, etc. In 1920 he was promoted to assistant engineer on the Atlanta division, and was holding this position at the time of his recent promotion.

W. O. Cudworth, division engineer of the Sudbury division, Algoma district of the Canadian Pacific, with headquarters at Sudbury, Ont., has been promoted to assistant engineer of maintenance, eastern lines, with headquarters at Montreal, Que., succeeding **Emmett Keough,** who has resigned to become Chicago representative for the American Fork & Hoe Co., as reported in the January issue. **J. M. Silliman,** assistant engineer at North Bay, Ont., has been promoted to division engineer at Sudbury, succeeding Mr. Cudworth. **L. W. Duclos** has been promoted from transitman to assistant engineer at North Bay, Ont., succeeding Mr. Silliman. Mr. Silliman was born in Easton, Pa., on September 8, 1885, and graduated in civil engineering from Lafayette college, Easton, Pa., in 1907. He entered railway service in June of that year with the Canadian Pacific as a transitman on the New Brunswick division, holding this position until December, when he was employed in reconnaissance on the Algoma district. From May, 1908, until March, 1911, he was again employed as transitman at various locations, in the latter year being promoted to resident engineer on construction, which position he held at various locations until March, 1915, when he was promoted to district engineer on construction. He was promoted to division engineer on the Laurentian division in January, 1916, holding this position until December, 1916, when he was transferred to the London division. He left the service of the Canadian Pacific in September, 1918, to become division engineer on the Susquehanna division of the Delaware & Hudson, where he remained until June, 1920, when he became inspecting engineer for the Canadian government on the Grand Trunk Railway arbitration. He returned to the Canadian Pacific in October, 1921, as a resident engineer on construction, and in December, 1923, was promoted to assistant to the district engineer on the Algoma district, which position he was holding at the time of his recent promotion to division engineer at Sudbury.

Sidney Beacon, roadmaster on the Gulf division of the International-Great Northern, with headquarters at Mart, Tex., has been promoted to division engineer of the newly organized Palestine division, with headquarters at Palestine, Tex. **L. M. Elledge** has been appointed assistant engineer

on the Palestine division, with headquarters at Palestine, Tex. **T. C. McCord,** division engineer of the San Antonio division, has been transferred to the reorganized San Antonio division, including the San Antonio, Uvalde & Gulf, with headquarters at San Antonio, Tex. **R. E. Caudle,** division engineer of the Gulf division, with headquarters at Palestine, Tex., has been transferred to the newly organized Houston division, including the Sugarland railway, with headquarters at Houston, Tex. **T. A. Youngblood** has been appointed assistant engineer of the Houston division, with headquarters at Houston, Tex.

Mr. Beacon was born at Albion, Ill., on September 23, 1886, and after doing special work at Drury College and finishing a special course at the University of Missouri, entered railway service as a rodman in the district engineer's office of the St. Louis-San Francisco in September, 1907. He remained with this road until December 31, 1917, during which time he served as transitman and assistant engineer, in that year being commissioned first lieutenant with the U. S. Engineers. He served with the American Expeditionary Force on general construction, operation and maintenance of French railways. On July 27, 1919, he returned to the Frisco as an assistant engineer in the division and district engineer's offices, resigning on January 1, 1925, to become a rail inspector with the International-Great Northern. He was promoted to roadmaster on the Waco district on April 15, 1925, holding that position at the time of his promotion to division engineer on that road at Palestine, Tex.

Sidney Beacon

Harold G. Watkins, track supervisor on the Boston & Maine, with headquarters at Gardner, Mass., has resigned to become assistant engineer maintenance of way on the Akron, Canton & Youngstown, with headquarters at Akron, Ohio. He was born at Plaistow, N. H., on July 2, 1890, and graduated from the Massachusetts Institute of Technology in 1911. He entered railway service in June, 1911, as a chainman on the Boston & Maine, being promoted to rodman in February, 1912. From June, 1912, to June, 1916, he served as instrumentman, in the latter year being made assistant track supervisor. He served with the Fourteenth Engineers in the U. S. Army from June, 1917, until May, 1919, at which time he returned to the Boston & Maine as an assistant track supervisor, holding that position until July, 1924, when he was promoted to assistant engineer. He was again made assistant track supervisor in September, 1925, and in January, 1926, was promoted to track supervisor, with headquarters at Gardner, which position he was holding at the time of his resignation.

Track

Harold K. Modery has been appointed assistant supervisor in the division engineer's office of the Reading, succeeding **H. C. Williams,** resigned.

R. P. Trabue, general roadmaster on the Nashville, Chattanooga & St. Louis, with headquarters at Nashville, Tenn., retired December 1, 1925. No successor will be appointed.

Hoke Brown has been appointed acting roadmaster of the Clinchfield Railroad, with headquarters at Erwin, Tenn., succeeding **A. L. Whitehead,** whose death is noted elsewhere.

T. D. Ruggles has been appointed roadmaster on the Canadian Pacific at LaRiviere, Man., succeeding **A. J. Megrund,** retired. **Robert McCrea,** roadmaster at Mattawa, Ont., has been transferred to Sault Ste. Marie, Ont., succeeding **R. Shanks,** retired. **E. McCrae,** section foreman, has been promoted to roadmaster, with headquarters at Mattawa, succeeding R. McCrea.

T. A. Blair has been reappointed roadmaster on the Colorado division of the Atchison, Topeka & Santa Fe, with headquarters at Pueblo, Colo., after temporary assignment to other duties. **R. E. Knapp,** acting roadmaster at Pueblo, Colo., has been assigned to other duties.

S. M. Robinson, roadmaster on the Fifth district of the Union Pacific (Los Angeles & Salt Lake unit), with headquarters at Caliente, Nev., has been transferred to the Fourth district, with headquarters at Las Vegas, Nev., succeeding **A. A. Gulley,** resigned. **H. F. Kretlow** has been appointed roadmaster at Caliente, Nev., succeeding Mr. Robinson.

A. L. Zimmerman, assistant engineer on the Gulf division of the International-Great Northern, with headquarters at Palestine, Tex., has been promoted to roadmaster of the Houston division, with headquarters at Houston, Tex. **C. H. Bowman,** roadmaster, has been transferred to the Ft. Worth district, with headquarters at Mart, Tex.

Earl Porter, whose promotion to supervisor of track on the Chicago & Alton, at Mexico, Mo., was reported in the January issue, was born at Galena, Kan., on April 4, 1885. He entered railway service as a section laborer on the Chicago, Burlington & Quincy at Hannibal, Mo., on April 4, 1905, and was promoted to section foreman on April 4, 1906. He left the service of the Burlington on August 4, 1916, to become section foreman on the Chicago & Alton, later being given charge of a surfacing gang. On December 10, 1922, he was transferred to a rail gang, and was holding that position at the time of his promotion.

R. B. Moore, track supervisor on the Birmingham division of the Southern, with headquarters of Birmingham, Ala., has been transferred to the Northern Alabama railway, with headquarters at Haleyville, Ala., succeeding **J. A. Collier. C. R. Gates,** track supervisor at Birmingham, has been transferred to North Birmingham, Ala., succeeding Mr. Moore. **O. L. Hitchcock,** track supervisor on the Mobile division, with headquarters at Wilton, Ala., has been transferred to the Birmingham division, with headquarters at Birmingham, succeeding Mr. Gates. **H. T. Davis,** track supervisor at Marion Junction, Ala., has been transferred to Wilton, Ala., succeeding Mr. Hitchcock. **W. T. Dunaway,** assistant bridge foreman, has been promoted to track supervisor on the Mobile division, with headquarters at Marion Junction, Ala., succeeding Mr. Davis.

Mr. Dunaway was born in Calhoun county, Ala., on April 30, 1891, and entered railway service with the Southern on March 1, 1900, as a laborer on a bridge gang. He was promoted to bridge mechanic and served consecutively from that time as assistant bridge foreman, pile driver foreman, pile driver engineer, steam shovel engineer, ditcher foreman, section foreman and extra gang foreman. He was holding the latter position at the time of his promotion to track supervisor.

Andrew M. Johnson, crew foreman on the Fitchburg-Berkshire division, of the Boston & Maine, with headquarters at Gardner, Mass., has been appointed assistant track supervisor, with the same headquarters, succeeding **Harold G. Watkins** who has resigned as noted elsewhere. **D. J. Vallier,** track supervisor at Newport, Vt., has had his jurisdiction extended to include both the former White Mountains division and the former Passumpsic division, with headquarters at Woodsville, N. H., succeeding **B. F. Brown,** retired. **G. A. Folsom** has been appointed assistant track supervisor at Newport, Vt. Mr. Brown, who had seen 52 years' railway service at the time of his retirement, was born at Lisbon, N. H., on October 11, 1854, and entered railway service in September, 1870, as a laborer in a fence crew of the Boston, Concord & Montreal and the White Mountains railroads which were consolidated in 1872. From 1870 until 1875 he served as a laborer in various crews on construction and maintenance for this road. In May, 1876, he entered the service of the Chicago, Milwaukee & St. Paul, also serving on the Chicago & Pacific for a short time. He left railroad service in April, 1877, returning on April 15,

1880, as a section foreman on the Portland division of the Portland & Ogdensburg. He returned to the Boston, Concord & Montreal, now a part of the Boston & Maine, on April 18, 1881, as assistant roadmaster, and on July 1, 1882, was promoted to roadmaster. From that date until his retirement he served as roadmaster and track supervisor in New Hampshire and Vermont.

John Wallin, district roadmaster of the Fourth district of the Butte division of the Great Northern, with headquarters at Great Falls, Mont., who was granted a 60 days' leave of absence, as reported in the January issue, has returned to work. **Calvin Hankins**, acting roadmaster, has been assigned to other duties. **F. Krona** has been appointed district roadmaster on the Third district of the Montana division, with headquarters at Havre, Mont., succeeding **F. Kubitza**, who has been assigned to other duties. Mr. Krona was born in Sweden on February 15, 1882. From 1896 to 1907 he was employed in mining and farming, in the latter year entering the service of the Great Northern as a section laborer, being promoted to a section foreman on May 1, 1909. In 1913 he was promoted to extra gang foreman, holding this position for four months when he was again made section foreman. He served respectively as extra gang foreman and section foreman until he was promoted to district roadmaster.

Frank G. Cook, roadmaster of the Rocky Mountain division of the Northern Pacific, with headquarters at Helena, Mont., has been promoted to division roadmaster of the Yellowstone division, with headquarters at Glendive, Mont. **Corbett W. Coil**, roadmaster at Missoula, Mont., has been transferred to Helena, Mont., succeeding Mr. Cook. **John A. Bryan**, roadmaster on the Dakota division, with headquarters at Mandan, N. D., has been transferred to Missoula, Mont., succeeding Mr. Coil. **Howard W. McCauley**, bridge and building inspector of the Yellowstone division has been promoted to roadmaster at Carrington, N. D., succeeding Mr. Bryan. Mr. Cook was born at Concord, N. H., on August 13, 1885, and graduated from Dartmouth in 1908, and from Thayer School of Civil Engineering, an associate school of Dartmouth, in 1910. While attending college he held several positions in the electrical division of the Boston & Maine. He entered the service of the Northern Pacific as a rodman on May 1, 1910, holding this position until May 1, 1911, when he was promoted to instrumentman. From January 1, 1912, until May 1, 1915, he served as an assistant engineer at Jamestown, N. D., on the latter date being promoted to roadmaster on the Mandan branches. He was transferred to Helena, Mont., on February 13, 1917, and was holding this position at the time of his promotion to division roadmaster. Mr. McCauley was born at St. Paul, Minn., on June 29, 1897. He attended the College of St. Thomas from 1910 to 1915 and the engineering college of the University of Minnesota from 1915 until 1917. He served in the United States Engineering Corps during the war and returned to railway service in February, 1918, in the engineering department of the Chicago, Milwaukee & St. Paul, at St. Paul, Minn. He left that road in December of that year to serve in the engineering department of the Great Northern at Superior, Wis. From June, 1920, until April, 1924, he held various positions in the accounting and valuation departments of the Great Northern, in the latter year going to the Northern Pacific to serve in the engineering department. He was made bridge and building inspector of the Yellowstone division, with headquarters at Glendive, Mont., in April, 1924, and was holding this position at the time of his recent promotion.

T. J. A. O'Sullivan has been appointed supervisor of track on Subdivision 12, Rochester division of the New York Central, with headquarters at Canandaigua, N. Y., succeeding **J. H. Anger**, who has been transferred to a new subdivision, No. 7-A, on the Mohawk division, with headquarters at Oneida, N. Y. **O. C. Anderson**, supervisor of track on Subdivision 6 of the Mohawk division at Fonda, N. Y., has been transferred to Subdivision 8 on the Adirondack division, with headquarters at Remsen, N. Y., succeeding **J. W. Bowe**, who has been transferred to Subdivision No. 6, succeeding Mr. Anderson. **J. E. Egan**, supervisor on Subdivision 22 on the Mohawk division, with headquarters at South Schenectady, N. Y., has been transferred to Subdivision 5, with headquarters at West Albany, succeeding **A. A. Johnson**, resigned to become engineer of track on the Delaware, Lackawanna & Western. Subdivision 22 has been abolished. The following appointments in the position of assistant track supervisor have been made on the Mohawk division: H. V. Smith, Subdivision No. 6, with headquarters at Fonda, N. Y.; **C. Horman**, Subdivision No. 7, with headquarters at Utica, N. Y.; **G. W. Clark** and **C. A. Maxeinor**, subdivision 7-A with headquarters at Oneida. **George Auer** has been appointed assistant supervisor of track, Subdivision 11, Rochester division, with headquarters at Rochester. **F. E. Ladd** has been appointed assistant supervisor of track, Subdivision 17, St. Lawrence division, with headquarters at Watertown, N. Y., and **Francis R. Gurnett** has been appointed assistant supervisor of track on Subdivision 8, Adirondack division, with headquarters at Remsen, N. Y.

Mr. O'Sullivan was born at Troy, N. Y., on December 30, 1889, and graduated from Rensselaer Polytechnic Institute in 1910. He entered railway service on July 9, 1910, as a chainman in the engineering department of the New York Central, at Utica, N. Y., leaving this road to become a rodman for the New York State Highway department on May 13, 1911, where he remained until May 1, 1913, when he returned to the New York Central as an instrumentman. He became transitman at Utica, N. Y., on September 21, 1914, and was promoted to assistant supervisor of track on the Syracuse division on September 17, 1916. From December 1, 1916, until July 16, 1917, he served as chief transitman at Buffalo, N. Y., being promoted to assistant division engineer of the Rochester division, with headquarters at Rochester, N. Y., on the latter date. He was holding this position at the time of his promotion to supervisor of track, with headquarters at Canandaigua, N. Y.

Bridge and Building

F. C. Beese, division master carpenter of the Willmar division of the Great Northern, with headquarters at Willmar, Minn., has had his jurisdiction extended to include the Sioux City lines, following the retirement of **William Brand**, master carpenter at Sioux City, Iowa.

R. L. Robbins has been appointed assistant supervisor of piers and buildings of the Eastern division of the New York Central, with headquarters at New York City. **Fred H. Smith** has been appointed assistant supervisor of bridges and buildings on the Ontario division, with headquarters at Oswego, N. Y.

Purchasing and Stores

J. P. Murphy, general storekeeper of the New York Central, lines west of Buffalo, with headquarters at Collinwood, Ohio, has been promoted to stores assistant to the manager of purchases and stores of the system, with headquarters at Cleveland, Ohio, a newly created position. **Frank J. McMahon** has been promoted to general storekeeper of the lines west of Buffalo, with headquarters at Collinwood, Ohio, succeeding Mr. Murphy.

R. C. Harris, general storekeeper of the Pennsylvania, with headquarters at Philadelphia, Pa., has been promoted to assistant stores manager, succeeding **G. W. Snyder**, who recently became assistant chief engineer in charge of maintenance. **C. B. Hall**, assistant to the general purchasing agent, has been promoted to general storekeeper, with headquarters at Philadelphia, Pa., succeeding Mr. Harris. **W. W. Morris**, assistant purchasing agent, has been promoted to assistant to the general purchasing agent, succeeding Mr. Hall, and **E. J. Lamneck**, assistant to the purchasing agent, has been promoted to stationery storekeeper, with headquarters at Pittsburgh, Pa., succeeding **A. W. Able**, who died recently.

Obituary

A. L. Whitehead, roadmaster on the Clinchfield Railroad, with headquarters at Erwin, Tenn., died recently.

Thomas Hall Gatlin, of Gatlin & Wolf, consulting engineers, Washington, D. C., and formerly chief engineer of construction of the Southern, died at a hospital in Washington on December 25.

Construction News

The Atchison, Topeka & Santa Fe has included in this year's budget the construction of a double track lift bridge over Old River at Orwood, Cal., to cost $400,000, and a power plant at Bakersfield, Cal., to cost $100,000.

The Atlantic Coast Line is contemplating the erection of a station at Naples, Fla.

The Baltimore & Ohio has awarded a contract to the Empire Construction Company, Baltimore, Md., for the reconstruction of bridges on the Lake branch, Akron division, to cost approximately $150,000. This company has asked for revised bids for the construction of a coaling station at Mitchell, Ind.

The Boston & Maine will build a modern coal distributing plant which will transfer coal from ships to railroad cars or to storage at a rate of 6,000 tons each eight-hour working day at its Mystic Wharf coal handling properties. The contract with John H. Proctor & Co., of Boston, who are now assembling the material for construction, calls for expenditures aggregating $450,000.

The Canadian National has awarded a contract to Pacific Engineers, Ltd., of Vancouver, B. C., for the construction of two slips, one at Ogden Point and the other at Point Ellice, Victoria, B. C., to be used in the handling of lumber for export.

The Central of Georgia is asking for bids for the construction of a nine-stall roundhouse, a storehouse, a boiler room and a lavatory at Albany, Ga.

The Central of New Jersey has awarded a contract to James A. Hart for grading preparatory to the construction of a new engine terminal at Bethlehem, Pa.; estimated cost, $128,600.

The Chicago & North Western has awarded a contract to Peppard & Fulton, Minneapolis, Minn., for the construction of a top deck on Dock No. 1 at Ashland, Wis., to cost $375,000. Plans have been prepared for the construction of 30 additional tracks with a capacity of three thousand cars at Proviso yard near Chicago at a cost of $2,000,000. The project will include construction of a subway for passage of a street under the yard. Plans have been prepared for the construction of a water treating plant at Norfolk, Neb., to cost $20,000.

The Chicago, Burlington & Quincy has prepared plans for the construction of a locomotive repair shop and an addition to the enginehouse at South Sioux City, Neb., to cost $90,000.

The Chicago, Indianapolis & Louisville will receive bids about April 1 for the construction of a passenger station at Bedford, Ind., to cost $50,000.

The Chicago, Rock Island & Pacific, is asking for bids for the construction of a one-story brick combination passenger and freight station, 24 ft. by 240 ft., with a kitchen annex 28 ft. by 35 ft., at Tucumcari, New Mexico. This company has applied to the Interstate Commerce Commission for authority for the construction of a line of 9.3 miles easterly from Clark's Grove, Minn.

The Cleveland, Cincinnati, Chicago & St. Louis is reported to be preparing plans for the construction of a second track from Bellefontaine, Ohio, to Kenton, a distance of 24 miles, at a cost of $1,000,000. Bids are being taken for the construction of an extension to the engine terminal facilities at Kankakee, Ill., to cost approximately $253,000. Included in the project are an extension to the roundhouse and a brick service building.

The Colorado & Southern will construct a passenger station this year at Trinidad, Colo., at a cost of $75,000.

The Denver & Rio Grande Western will construct a new passenger station at Ogden, Utah, at a cost of approximately $60,000.

The Florida East Coast has awarded a contract to the John A. Kelly Company, Philadelphia, for grading in connection with additional trackage from Gomez, Fla., to Jupiter (8 miles), and to the C. R. Cummins Company, Cleveland, Ohio, for similar work from Sebastian to Indrio (22 miles). A contract has been awarded to the Charleston Engineering & Contracting Company, Charleston, S. C., for the construction of a number of ballast deck trestles between Sebastian and Indrio.

The Great Northern is preparing plans for the construction of a passenger terminal at Glacier Park, Mont., to cost $100,000.

The Missouri Pacific will soon ask for bids for the construction of 23 miles of additional double track, between St. Louis, Mo., and Jefferson City. A contract has been awarded for a reclamation plant at Sedalia, Mo., to J. C. Duncan, St. Louis, Mo. This company is also asking for bids for the construction of a one-story brick freight station, 40 ft. by 240 ft., at McGehee, Ark.

A second track will also be constructed from Alexander Junction, Ark., to Bauxite, a distance of 5 miles, providing a second track for the entire distance from Little Rock, Ark., to Benton. Plans are being prepared for the construction of a freight house at Coffeyville, Kan., to cost approximately $125,000, and a freight house and track changes at Omaha, Neb., to cost approximately $135,000. Plans for the construction of a joint union passenger station at Texarkana, Ark., in which the Texas & Pacific, the Kansas City Southern and the St. Louis-Southwestern will also participate are being considered. Tentative estimate of the cost of the entire structure including rerarrangement of the existing track facilities and general layout is $1,300,000.

Mechanical coaling stations are planned for construction this year as follows: 350-ton at Washington, Mo., to cost $50,000, and 250-ton at Centerview, Mo., and Archie, each to cost $40,000. Construction of a water softening plant at Horace, Kan., at a cost of $65,000 is contemplated. The contract for the construction of a one-story brick freight station 40 ft. by 240 ft. at McGeehee, Ark., has been awarded to Herman & McCain Construction Co., Little Rock, Ark.

The New York Central has awarded a contract to the Walsh Construction Company, Davenport, Iowa, for the elimination of grade crossings at South William, Kemp and Water streets, Newburgh, N. Y.; at a cost of about $210,000. This company has reached an agreement with the city authorities of Buffalo, N. Y., whereby it will begin work shortly on a new terminal station in that city.

The Norfolk & Western has awarded a contract to Roberts & Schaefer Co., Chicago, for the construction of a 2,000-ton, 6-track automatic electric roller skip type coaling and gravity sanding plant at Portsmouth, Ohio, to cost approximately $125,000.

The Northern Pacific, according to press reports, contemplates the construction of a cut-off from Connell to Ellensburg, Wash., which would effect a considerable reduction in the main line mileage to the coast by eliminating the swing southward from Connell through Pasco and Yakima.

The Pennsylvania has awarded a contract to the American Bridge Company, New York, for the fabrication and erection of a steel superstructure for extending the tank shop at Olean, N. Y., to cost $225,000. A contract has also been awarded to the John Fleasey Company, Pittsburgh, Pa., for grading and masonry in connection with the elimination of grade crossings at Dixmont and Glenfield, Pa., to cost $560,000. Tentative agreement has been reached between this company and city authorities of Newark, N. J., calling for a new station at that point for the railroad and the Hudson & Manhattan, an extension to the latter road and bridges for 6 tracks across the Passaic river. This company has awarded a contract to the McNichol Paving & Construction Company, Philadelphia, for filling in connection with its new $2,200,000 produce yard to be constructed at Delaware avenue and Packer street in that city. This company will proceed with the elevation of its Twenty-fifth street line in South Philadelphia, Pa., from the end of the work now under way, near Washington avenue, to the south end of the viaduct at Passyunk avenue. Bids on the viaduct will be asked for as soon as the detailed plans are completed. Construction work will be started early in the spring. Completion of the viaduct will require a total expenditure in excess of $3,000,000.

Lyman S. Peek, Inc., Philadelphia, has received a contract for the extension of the erecting and machine shops at Olean, N. Y., at a cost of approximately $100,000.

The Seaboard Air Line was granted by the Interstate Commerce Commission an extension of the time until February 1 when it and its subsidiaries must begin the construction of their extensions in Florida.

The Southern Illinois & Kentucky has asked for bids for the construction of a reservoir at Blue Ford, Ill.

The Southern Pacific has awarded a contract to Lewis & Green, Stockton, Cal., for the construction of a subway under the tracks of the Southern Pacific and the Western Pacific at Miner avenue, Stockton, to cost approximately $100,000. The 1926 improvement program of this company calls for the expenditure of $2,000,000 at Fresno, Cal. The yards will be moved to a new site, recently purchased, two miles north of Fresno. Classification yards, an icing plant and increased shop facilities are included in the program. During the year $15,000,000 will also be spent on the line from Picacho, Ariz., to Casaba and from Hassayampa to Dome.

A contract for all concrete work in connection with the construction of tunnels on the Natron cut-off from Oakridge, Ore., to Kirk, has been awarded to the Utah Construction Company, San Francisco, Cal.

The Terminal Railroad Association of St. Louis is constructing a yard at Jefferson avenue involving 300,000 cu. yd. of grading, a 350-ft. extension of the Jefferson avenue viaduct, a reinforced concrete foot bridge, a concrete retaining wall, a concrete service building two stories high, 20 by 500 ft., and other yard buildings, and the construction of 21 storage tracks, each 1,000 ft. long.

The Union Pacific in connection with the application for permission to make permanent use of the Southern Pacific passenger station at Los Angeles, Cal., has requested permission to construct a double-track bridge across the Los Angeles river near Seventh street, and a double track viaduct across East Seventh street.

The Union Railroad has awarded a contract to the Roberts & Schaefer Co., Chicago, for the construction of a reinforced concrete automatic electric coaling and sanding station and an electric cinder plant at Hall, Pa., to cost approximately $30,000.

The Wabash has reached an agreement with the city of St. Louis, Mo., under which the grade crossing at Delmar boulevard will be eliminated by the construction of a viaduct over the tracks. The construction of the viaduct will be undertaken jointly by the Wabash and the city. It will be of reinforced concrete construction and will cost approximately $625,000, of which the Wabash will pay 60 per cent. It is proposed that the Wabash erect also a new passenger station at Delmar boulevard to conform with the architecture of the bridge.

The Wenatchee Southern has been granted by the Interstate Commerce Commission an extension of time until July 1, 1926, when it must begin the construction of some 82 miles of line in the state of Washington, and to June 30, 1928, the time when construction must be completed. Under the original grant of authority construction was to have started prior to January 1, 1925. This was later extended to January 1, 1926, and is now advanced another six months.

The Wichita Falls & Southern has received bids for the construction of a two-story brick and concrete freight depot at Wichita Falls, Tex., to cost approximately $75,000.

The Central of Georgia has been calculating its expenses for a year in terms of days, the unit being one three-hundred-and-sixty-fifth of the gross receipts for the year. It took the revenue for 159 days to meet the payroll, and that for 94 days went for the purchase of material and supplies. The income for 22 days' operation paid for fuel, and the earnings of 17 days went to pay taxes. The results of 54 days' operation were required to pay interest charges and rentals. These payments combined used up the income from 346 days; and of the earnings from the 19 remaining days, 14 days were paid for dividends and five for the improvement of the property. The Central of Georgia is paying more for taxes than it does for dividends.

Supply Trade News

Personal

J. B. Marks, assistant to the president of the **Colorado Fuel & Iron Company,** also has been elected vice-president in charge of sales, traffic and purchases.

H. F. Shields, for 30 years a representative of the Flood & Conklin Co., Newark, N. J., has resigned to become representative of the Williams-Hayward Company, Chicago.

James H. Enochs, representative of the **Harnischfeger Sales Corporation,** Milwaukee, Wis., has been appointed manager of the new branch established at Indianapolis, Ind.

G. A. Secor, general storekeeper of the Chicago & Alton, with headquarters at Bloomington, Ill., has resigned to become sales representative of the Buda Company, Harvey, Ill., with headquarters in Chicago.

A. M. Branum, formerly sales engineer of concrete reinforcement and specialties of Joseph T. Ryerson & Co., Chicago, has been appointed representative of the **Jones & Laughlin Steel Corporation,** with headquarters in Chicago, Illinois.

R. M. Chissom, special representative of the Lehon Company, with headquarters in Chicago, has resigned to become manager of railway sales of the **Otley Paint Manufacturing Company,** Chicago.

Ross M. Blackburn, formerly general storekeeper of the Chicago & North Western, with headquarters at Chicago, has joined the railroad sales force of the Buda Company, with the same headquarters.

Frank C. Webb, representative of the Railroad Supply Company, Chicago, with headquarters at Denver, Colo., and at one time a division superintendent on the Colorado & Southern and on the Great Northern, died at Denver on January 12.

At the next annual meeting of the **Pressed Steel Car Company,** Jersey City, N. J., on February 17, action will be taken on a proposed merger into the company of the Western Steel Car & Foundry Co., one of its subsidiary companies, with plant at Chicago.

Benjamin F. Brown, vice-president of the Otley Paint Company, and Marcus G. Lindsay, secretary, have resigned to organize the Brown-Lindsay Paint Company, manufacturers of structural, industrial and railway paints, 1420 Center street, Chicago.

Arthur W. Armstrong, secretary and treasurer of the **Ayer & Lord Tie Company,** Chicago, has been elected president and general manager, to succeed Russell Lord, deceased. Graeme G. Botts has been appointed treasurer, and Samuel E. Pryce has been appointed assistant treasurer.

William B. Albright, a director of the Sherwin-Williams Company, Cleveland, Ohio, died suddenly on December 28, while visiting in Cleveland. He was born in Philadelphia, Pa., on July 17, 1855, and has been connected with the Sherwin-Williams Company since January, 1885, serving as a director since 1894.

Lewis S. Louer, vice-president of the Engineering and Contracting Publishing Company, Chicago, died suddenly on January 9. He was born in Newcastle, Pa., on June 11, 1874, and graduated from the mechanical engineering school at Cornell University in 1894. In 1900 he was appointed western manager of Engineering Record and later was appointed western manager of the F. W. Dodge Company. In 1918 he was appointed vice-president of the Engineering and Contracting Publishing Company, which position he held until his death. He was a director of the American Road Builders' Association.

J. Howard Horn, sales manager of **The National Lock Washer Company,** Newark, N. J., has been elected general sales manager, with headquarters at Newark. Mr. Horn was educated at The Newark Academy and later at Princeton University, from which he received a B. S. degree in 1907. He served with the Rogers works of the American Loco-

motive Company's plant at Paterson, N. J., as special apprentice and later at the Cook works of the same company and in the same capacity. In 1909, he served an apprenticeship in the car shop of the Public Service Railway Company, Newark, N. J. In January, 1910, he entered the sales department of the National Lock Washer Company at Newark and has been in the continuous service of that company ever since. He was promoted to sales manager in 1917, which position he held at the time of his recent election to general sales manager as above noted.

T. W. Barry, estimating engineer of the Louisville Frog & Switch Company, Louisville, Ky., has been promoted to chief engineer. Mr. Barry was born at Louisville and graduated from St. Xavier's College, after which he entered the engineering department of the Pennsylvania System, where he remained for five years. On July 31, 1922, he entered the engineering department of the Louisville Frog & Switch Company as cost engineer, later taking over the duties of supervisor of the crossing section of the shop. In January, 1924, he was transferred to the engineering department as a draftsman and a short time later was promoted to estimating engineer, the position he held at the time of his recent advancement.

General

The National Lock Washer Company has changed its Chicago address from 1535 Lytton building to 1103 Straus building.

The Reliance Manufacturing Company, Massillon, Ohio, has opened an office at 736 Peoples Gas building, Chicago, in charge of **Robert Shireman.**

The Browning Crane Company, Cleveland, Ohio, has opened an office at 1201 Peoples Bank building, Pittsburgh, Pa., in charge of **D. C. Harris.**

The Celotex Company has purchased property at Marrero, La., and plans the construction of a new unit for its plant at that point to cost $1,500,000.

The Harnischfeger Sales Corporation, Milwaukee, Wis., has moved its Birmingham, Ala., office from 431 First National Bank building to 401 Pioneer building.

The Buda Company, Harvey, Ill., has opened an office at 405 Forsyth street, Jacksonville, Fla., and has placed **A. L. Bliss,** formerly representative, with headquarters at Chicago, in charge of the new office.

The Mechanical Manufacturing Company, Chicago, has opened an office at 323-E Hudson Terminal building, 30 Church street, New York. **J. A. Keating,** representative, with headquarters at Chicago, will be in charge. **H. E. Johnson,** representative at Chicago, has been transferred to the eastern office.

The American Creosote Works, New Orleans, La., has completed its plans to purchase the Atlantic Creosoting & Wood Preserving Works at Norfolk, Va. The company has acquired a large waterfront property fronting on deep water and adjacent to the Portsmouth Navy Yards. Plans are being made to erect a large creosoting plant to take care of eastern business. **W. H. Wales,** formerly president of the Atlantic Creosoting & Wood Preserving Works will be in charge and the entire personnel of the Atlantic Creosoting & Wood Preserving Works will be retained. This plant will be operated under the management of the American Creosoting Works.

Trade Publications

Makes Short Work of Tall Snow Piles.—This is the title of a folder recently issued by the Hayward Company which shows by text and photograph how Hayward clam shell buckets are used to clean up snow in city streets, picking up the snow from piles at the curb line and loading motor trucks. One page is devoted to an account of the use of a locomotive crane equipped with a Hayward orange peel bucket for cleaning up accumulations of snow on railway tracks.

Celite in Concrete.—The Celite Products Company, Los Angeles, Cal., has issued a bulletin of 12 pages, known as bulletin No. 314, which presents in the form of an article or technical report the properties of Celite and the results secured by using it as an admixture in concrete. The subject matter covers the chemical and physical properties of the material, its behaviour when used in concrete and references to its application in various types of structures. Numerous half-tones illustrate its application in bridges, reservoirs, buildings, etc.

Floodlighting Projectors.—This is the title of Bulletin No. 216 recently issued by the Electric Service Supplies Company of Philadelphia. The bulletin contains 72 pages and is well illustrated with photographs and drawings in which applications of the Golden Glow and Crystal Mirror reflectors are described in detail. All of the various kinds of flood lighting equipment manufactured by the company are shown and complete information as regards type, dimensions and prices are furnished.

Steel Building Standards and Specifications.—The American Institute of Steel Construction, Cleveland, Ohio, has issued a bulletin of 64 pages of data and specifications of value to designers of steel buildings. The last 35 pages comprise specifications for the design, fabrication and erection of structural steel buildings, these specifications having been prepared by a committee of engineers selected to carry out this work for the institute. The first 28 pages contain material in explanation of or supplementary to the specifications, including rivet tables, column diagrams and explanations of the charts, tables and formulas. Among the most interesting features of the bulletin is a discussion of columns, which includes a list of some 28 column formulas, together with a diagram which affords an unusual opportunity for comparison of these formulas.

Equipment and Supplies

The Anaconda Copper Mining Company has ordered 20 air dump cars of 30 cu. yd. capacity from the Magor Car Corporation.

The Chicago & Northwestern has ordered 250 Hart improved ballast and work cars from the Rodger Ballast Car Company.

The Chicago, Burlington & Quincy is expected to enter the market soon for approximately 7,000 tons of tie plates and 3,000 tons of splice bars.

The Great Northern has ordered three locomotive cranes from the American Hoist & Derrick Company.

The Gulf, Mobile & Northern has given an order to the Pressed Steel Car Company, at its Koppel plant, to build 12 drop door type air dump cars of 30 cu. yd. capacity.

The Minneapolis, St. Paul & Sault Ste. Marie is expected to enter the market soon for approximately 10,000 tons of 110-lb. rail and 5,000 tons of tie plates.

The Missouri-Kansas-Texas has ordered 5,500 tons of rails from the Tennessee Coal, Iron & Railroad Co., and has divided an order for 4,500 tons of rails between the Illinois Steel Company and the Inland Steel Company.

The Missouri Pacific has ordered one standard ditcher from the American Hoist & Derrick Co.

The Mobile & Ohio is inquiring for from 2,500 to 4,000 kegs of track spikes and from 400 to 700 kegs of track bolts.

The Nashville, Chattanooga & St. Louis is inquiring for from 50 to 100 ballast cars.

The Pere Marquette is expected to enter the market for 15,000 tons of rails.

The Southern Pacific has ordered 10,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

The Union Pacific has placed orders for 500 ballast cars with the Rodger Ballast Car Company and 500 Enterprize ballast cars with the Pullman Car & Manufacturing Corporation.

The Wabash has ordered 520,000 tie plates from the Illinois Steel Company, 280,000 from the Inland Steel Company, 100,000 from the Scullin Steel Company, and 100,000 from the Interstate Iron & Steel Co.

District Sales Agencies:

Philadelphia, Pa.
Pittsburgh, Pa.
Cleveland, Ohio
Detroit, Mich.
St. Paul, Minn.
Omaha, Nebr.
St. Louis, Mo.
Kansas City, Mo.
Joplin, Mo.
Atlanta, Ga.
Jacksonville, Fla.
New Orleans, La.
Roswell, N. Mex.
Denver, Colo.
Salt Lake City, Utah
Phoenix, Ariz.
Los Angeles, Calif.
Charlotte, N. C.
Calgary, Alta., Can.
Edmonton, Alta., Can.

"American" pumps are husky in design. All bearings are of generous proportion. Each type is compact. Wide footings and ample bases give great rigidity. Hydraulic efficiencies are high. And each "American" pump is absolutely guaranteed for the service for which it is recommended!

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New York, N. Y.....165 Broadway
Dallas, Texas.....Western Indemnity Bldg.
San Francisco, Calif.....635 Mission Street

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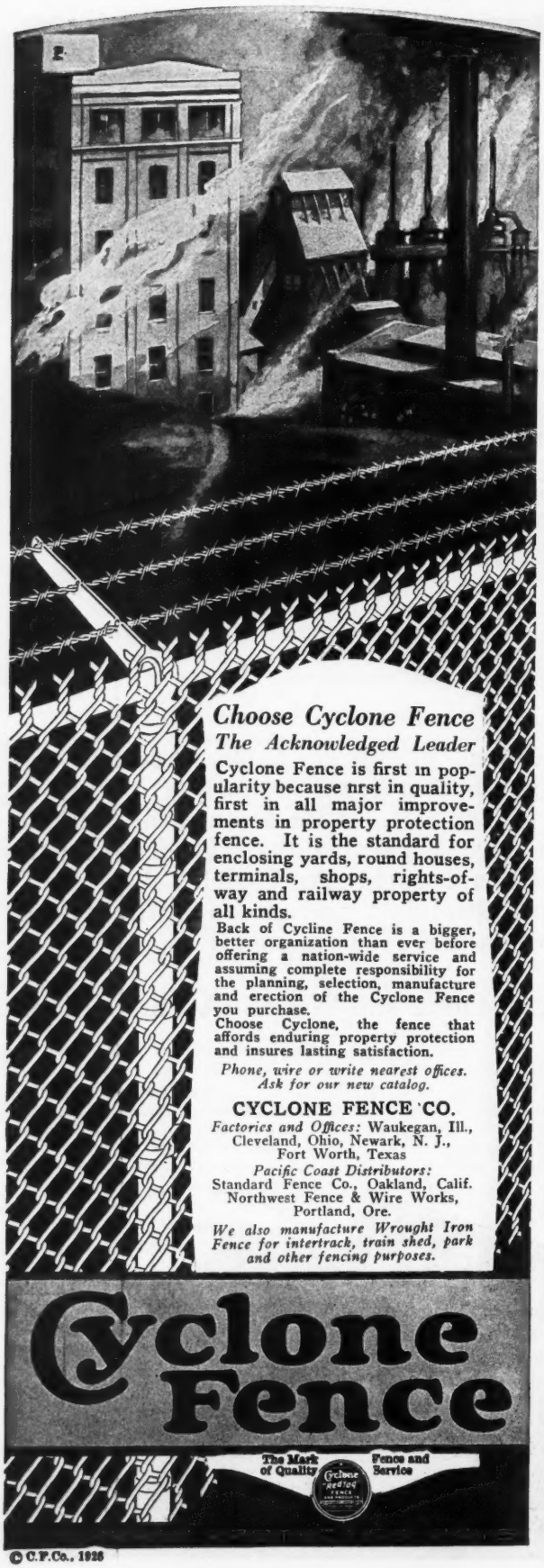
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Fence and Service
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HERE IS YOUR OPPORTUNITY

The railways are planning to spend more than $800,000,000 in 1926 for improvements and additions to their properties. Maintenance programs will be equally liberal. The significance of this in connection with

THE ANNUAL LABOR SAVING NUMBER

of

RAILWAY ENGINEERING and MAINTENANCE

is apparent. This issue is an established institution to which maintenance officers look for the latest information regarding supplies and equipment.

The March issue will appear just in advance of the annual convention of the American Railway Engineering Association and the exhibit of the National Railway Appliances Association.

The latest devices designed for the use of engineering departments will be on exhibit. The manufacturers of these will not fail to recognize the value of calling attention to these products through the advertising columns of this issue of Railway Engineering and Maintenance, which will reach the railway man before he leaves his home for Chicago. Those who for any reason do not exhibit can overcome much of the loss of such publicity by following the same course.

There has never been a better time, or a better means, for manufacturers to bring before officers of the engineering and maintenance departments information regarding the latest improvements in their products so that they can be included in the working programs of the roads.

The March issue will be the last call for this purpose.

TAKE ADVANTAGE OF THIS OPPORTUNITY

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(March Issue)

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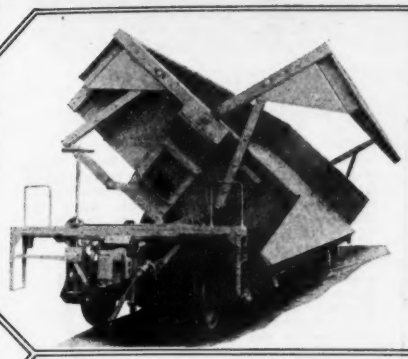

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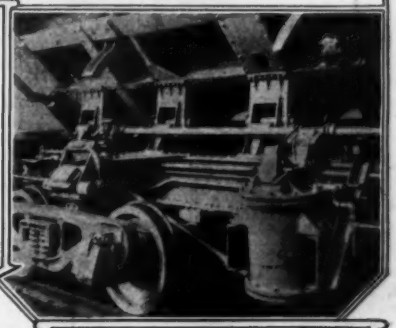

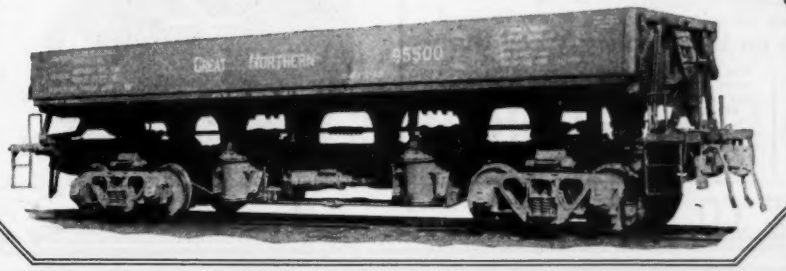

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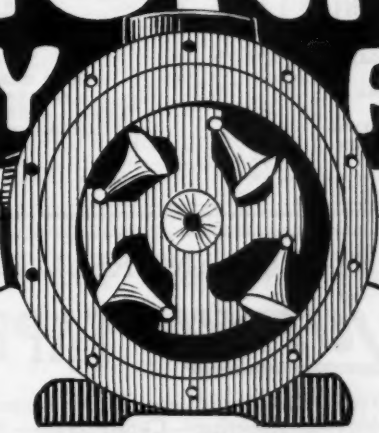

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709 Title Bldg., Baltimore, Md.	608 So. Dearborn St., Chicago, Ill.	4025 Boulevard Place, Indianapolis, Ind.	429 Broadway, Milwaukee, Wis.	71 Murray St., New York, N. Y.	1516 Pine St., St. Louis, Mo.
428 Old South Bldg., Boston, Mass.	1347 Book Bldg., Detroit, Mich.	1505 Commerce Bldg., Kansas City, Mo.	549 Plymouth Bldg. Minneapolis, Minn.	904 Real Estate Trust Bldg., Philadelphia, Pa.	693 Mission St., San Francisco, Calif.

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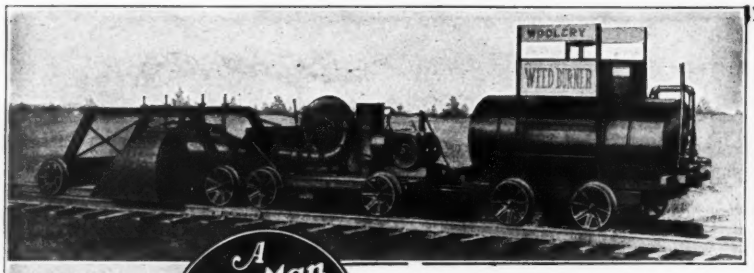
GRAND RAPIDS (FORMERLY PETOSKEY) MICH.



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Woolery Railway Weed Burners

(Patent Applied For)

There is no question but that it has saved this company a great deal more than the price of the machine just in this season.
Signed by
Asst. Gen. Roadmaster of a prominent railroad

A Self-propelled, three-unit outfit operated by two men. Speed from 1 to 5 miles per hour for burning, and up to 20 miles an hour for traveling. Compared with large and cumbersome machines, the Woolery is light—quick—nimble. Being easy to handle and quick to fire it gets around and can be used in places and on short burnings where other machines would be impractical. It may be removed from track at highway crossings. Total length of outfit, about 34 feet.

Always Ready for a Demonstration on any Railroad

High Lights on the Woolery Weed Burner

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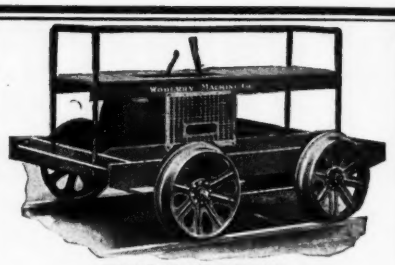

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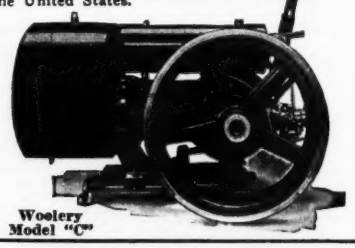
Woolery Truss-Frame Railway Motor Cars, while of light weight, possess extraordinary strength. When equipped with our new 2-speed transmission and powered with either the Woolery Model "C" (9 h.p.) or the Model "CC" (18 h.p.) engine, it is a universal car that meets all-around requirements.

Because of their lighter weight, greater power, and less cost per horse power, Woolery Reversible, Ball Bearing, Motor Car Engines have been adopted as standard equipment on some of the largest railroads in the United States.



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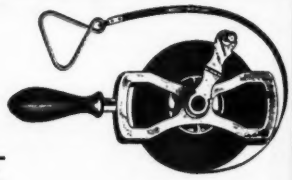


In Patterns Best for Every R. R. Requirement—Surveying—Engineering—Construction—M. of W. Steel Tapes with *Instantaneous* Readings and Nubian Finish. Michigan Chain (Chicago Style) Tapes with ½ gage mark and improved pattern reels.

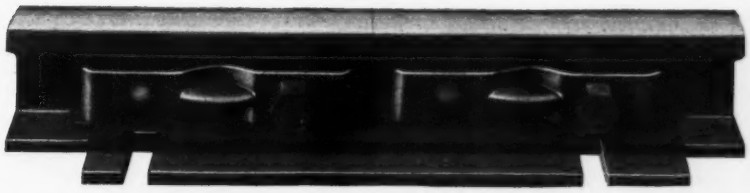
Among our popular woven lines are the "Metallic," and the low priced tapes for all common uses, the Ass Skin, and the Universal No. 733R Linen Corded with First Three Feet Reinforced.

STOCKED BY RAILWAY SUPPLY AND HARDWARE HOUSES.

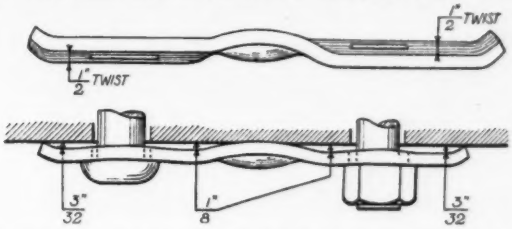
Send for Catalogue **THE LUFKIN RULE CO.** SAGINAW, MICH. New York Windsor, Ont.

EVERTITE RAIL JOINT SPRING LOCK

Patented Jan., 1925



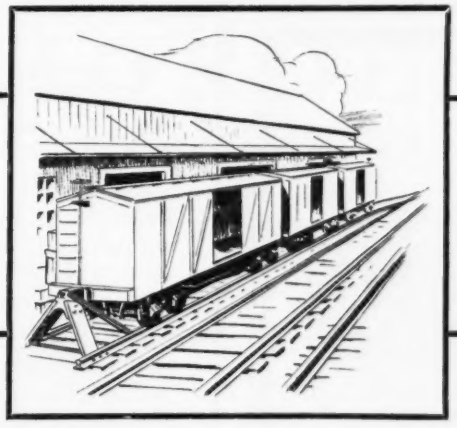
A REINFORCED SPRING NUT LOCK WITH A TWIST



MANY TESTS AND LONG SERVICE HAVE PROVEN ITS MERITS

WOODINGS FORGE & TOOL CO.

VERONA, PENNA.



The Bridge Has Its Guard Rail, The Stub Track Has Its "Durable"

Safety demands that cars must run over a bridge and that they must not overrun a track end.

Every bridge has its guard rail to guide a car safely across in the event of a derailment. Every track end should have its Durable Bumping Post to stop the car that gets out of control or is carelessly handled.

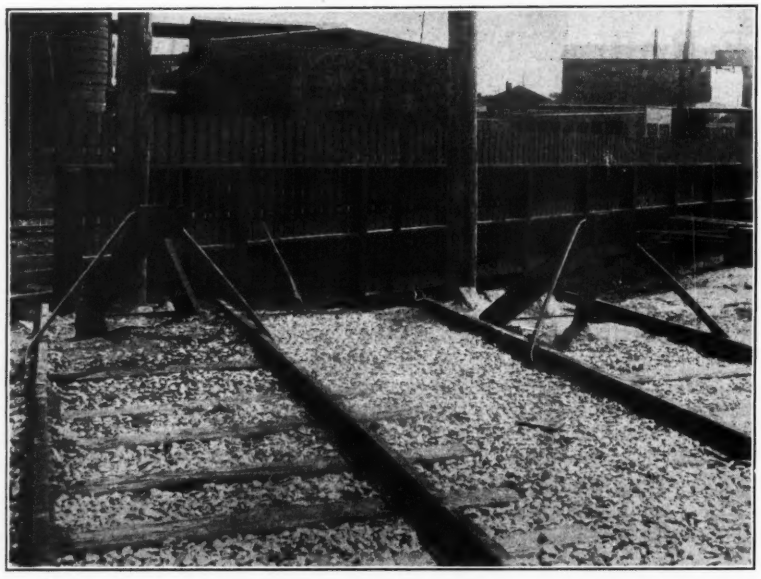
Safety dictates the use of the Durable Bumping Post just as universally as the bridge guard rail. It is not an expense. It is much cheaper than paying for the damage caused by over-running cars. The Durable is simple and economical to install, requires no excavation, and its maintenance is negligible.

MECHANICAL MANUFACTURING CO.

Also Manufacturers of the Ellis Bumping Post

PERSHING ROAD AND LOOMIS STREET, CHICAGO

New York Office, Room 323-E, Hudson Terminal Building



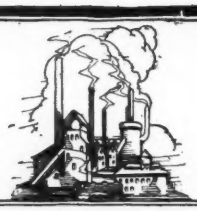
The Lawrence All Steel Bumping Post has proven to be a great thing for the Railroads. They not only reduce the maintenance expense of Posts—but of cars which hit them.

The earth absorbs the shock, thus relieving the post and cars of excessive strains.

Ask for Circular and Price

LOUISVILLE FROG & SWITCH CO.

Louisville **Kentucky**



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DIXON'S

SILICA-GRAPHITE PAINT

for the economical protection of all metal and wood work.

Long service records of from five to ten years are obtainable with Dixon's Paint because of the unusual wear-resisting pigment—flake silica-graphite, and its vehicle—pure boiled linseed oil.

The pigment is inert, aids in preserving the original elasticity of the vehicle, increases the thickness of the paint film and has long life. The vehicle cannot be equalled by any other substance.

Write for new Booklet 187-B and long service records

Joseph Dixon Crucible Co.

Jersey City, N. J. - Established 1827

Lime-Soda Water Softeners

We make LIME-SODA WATER SOFTENERS of both the ground operated and top operated types to purify water for prevention of scale deposits and corrosion in locomotive boilers.

The saving that is being effected by purifying water is most ably portrayed in the recent report of the Water Service Committee at last year's Chicago Convention of the American Railway Engineers' Association. We recommend this report for your careful consideration.

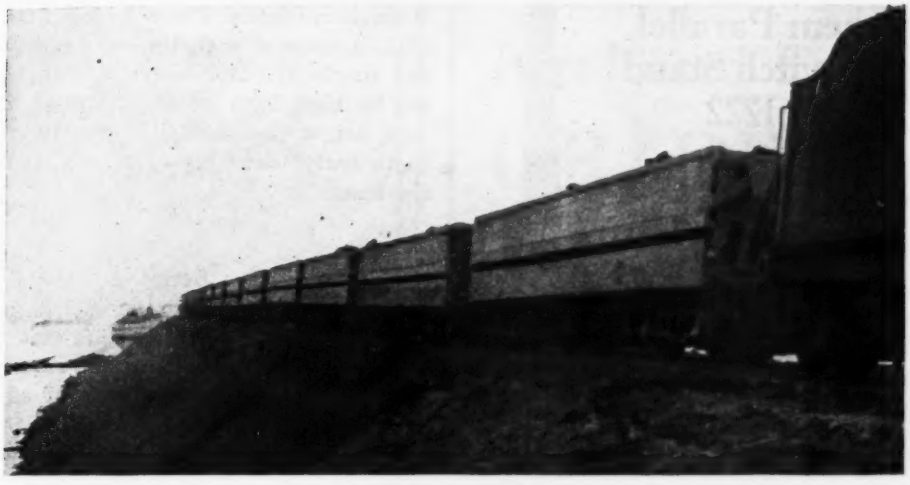
Write for our literature which gives, in detail, the results of our twenty-three years' experience in furnishing WATER SOFTENER PLANTS to twenty-six American Railroads.

American Water Softener Company

Fairhill P. O. Philadelphia, Pa.

Specialists for twenty-three years in Railroad

Water Purification



— MAGOR —

AUTOMATIC AIR DUMP CARS

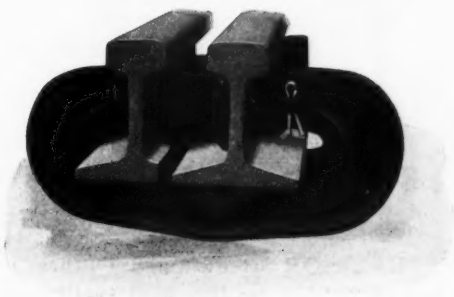
The cars designed and built by this corporation are the results obtained after 15 years of intensive study by expert engineers.

Combining special features such as the Magor Positive Compression locks, Magor quick lift door operating levers, Magor new design doors with extra wide opening, combined with most modern design in steel construction. Dumping cylinders operated by hand rods under end platform allowing operator to stand clear of track and dump on either side without preliminary adjustment. Standard equipment throughout to A. R. A. requirements. Ask for Catalog D.

MAGOR CAR CORPORATION **30 Church St.** **NEW YORK CITY**

MORDEN

TRACK SPECIALTIES



ADJUSTABLE GUARD RAIL CLAMP

A clamp for heavy service with universal drop forged yoke made of special heat treated steel.

This clamp is GUARANTEED. A clamp that is not dependable is expensive at any price.

Made for rails from 80 to 130 lbs. per yd.

ADJUSTABLE RAIL BRACE

A heavy malleable brace for general use on switches, slip switches and guard rails.

Should be in use on all interlocked switches to insure an easy and close adjustment for taking up wear between rail, brace and plate.

MORDEN FROG & CROSSING WKS.

CHICAGO

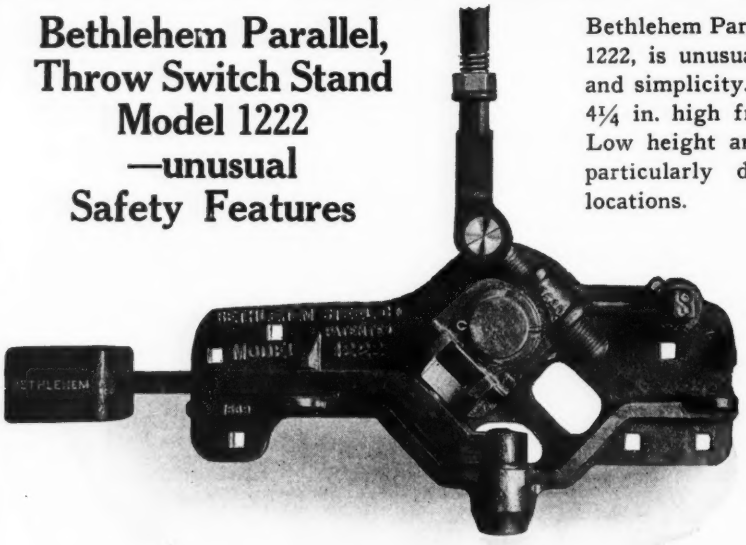
Manufacturers of

FROGS, CROSSINGS, SWITCHES SWITCH STANDS, GUARD RAIL CLAMPS

All Kinds of Standard and Special Track Work for Steam and Electric Railways

COMPROMISE JOINTS, RAIL BRACES, TIE BARS, DERAILS, SLIDE PLATES, ETC.

Bethlehem Parallel, Throw Switch Stand Model 1222 —unusual Safety Features



Bethlehem Parallel Throw Switch Stand, Model 1222, is unusual with its low height, strength and simplicity. It is lower than the rail (only 4¼ in. high from tie to bottom of lamp tip). Low height and parallel throw lever make it particularly desirable for use in confined locations.

Bethlehem Model 1222 is built up of but three moving parts, is easy to throw, boltless, and readily adjustable (range of adjustment, 3½ in. to 6 in.). One Model 1222 installed almost four years ago has been thrown over 600,000 times.

BETHLEHEM STEEL COMPANY *General Offices* **Bethlehem, Pa.**

District Offices in the following cities:

New York, Buffalo, Boston, Cleveland, Cincinnati, Philadelphia, Detroit, Baltimore, Chicago, St. Louis, Washington, San Francisco, Atlanta, Seattle, Pittsburgh, Los Angeles

Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Export of Our Commercial Products

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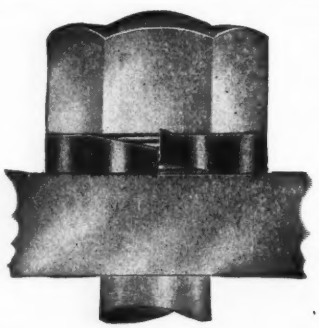

GENUINE
"KEYSTONE" Positive Lock Washers

Use Positives and forget to worry about the damage caused by vibration. Positives are the cheapest protection and the best.

Genuine KEYSTONE Positive and Plain Lock Washers made exclusively by

The Positive Lock Washer Co.

Miller St. & Ave. A, Newark, N. J.

80 James Watt St. Glasgow, Scotland

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"NOT A KICK IN A MILLION FEET"

MULE-HIDE "NOT A KICK IN A MILLION FEET" ROOFING AND SHINGLES Reg U.S. Pat. Office

SUPERIOR Strength and Tuffness is so visible in the construction of Mule-Hide Shingles and roll roofing that we submit this characteristic as the most practical reason why Mule-Hide Roofs, —*just naturally wear longer.*

Write to us for a sample of Mule-Hide that we may demonstrate convincingly this sturdier construction. Address Dept. D. H.

THE LEHON COMPANY

Manufacturers

West 44th to 45th Street on Oakley Avenue

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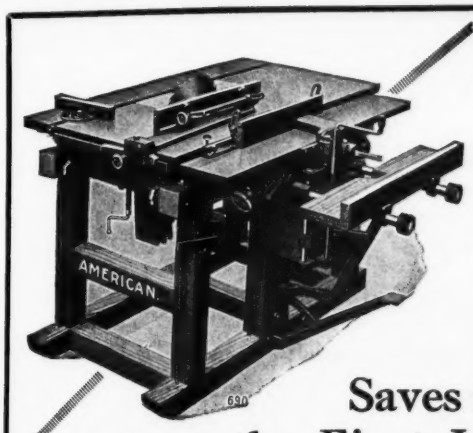


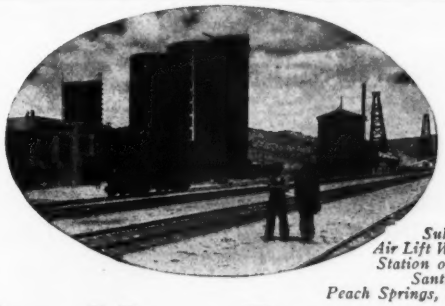
Saves its cost on the First Job

This American Portable Variety Woodworker lets you do any woodworking operation of either a routine or special nature right on the job. Figure the saving over hand or shop work! Hundreds are now in use.

This one machine may be used as a rip or cut-off saw, as a dado, gaining, grooving, rabbiting, tenoning or boring machine, as a jointer or planer, a matcher, molder or sander and as a hollow chisel mortiser.

Let us send you our Bulletin No. 80 describing our full line of Woodworking Machines for use on the job or in the shop.

American Saw Mill Machinery Co.
164 Main Street, Hackettstown, N. J.
"American" Saw Mills and Woodworkers



Sullivan Air Lift Water Station on the Santa Fe, Peach Springs, Ariz.

How Many Pumpers?

How Many Pumpers on your division?

How many hours or days per month do they work to keep up your water service?

How many orders a year does your dispatcher send to trainmen—*"Water Station 123 out of order; take from No. 127"?*

SULLIVAN AIR LIFT

is trouble free; and secures maximum output from your wells at all times.

There are no moving parts in the well. Remote control and automatic stop and start systems are available, reducing labor almost to zero.

Ask for Railway Bulletin No. 19,129

SULLIVAN TRADE MARK
MACHINERY COMPANY
411 Peoples Gas Bldg. Chicago

Reinforced Concrete CRIBBING

An additional track or a better alignment is often badly needed where right of way is restricted by an adjacent stream, another railroad or improved property which could only be secured at a prohibitive cost.

The ideal solution for such a problem is a Massey Type H Crib Wall as shown in the illustration above. It is lower in first cost than a monolithic wall and is just as stable and just as permanent. An additional advantage is that it can be laid by hand. It is not necessary, therefore, to interrupt traffic in the least during the construction of such a wall.

Have you our latest Catalog Supplement No. 20?

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Canadian Concrete Prod. Co., Ltd.

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JORDAN SPREADER
"Does the Work of an Army of Men"
SNOW PLOW ICE CUTTER DITCHER
UNIVERSALLY STANDARD
O. E. JORDAN COMPANY
WALTER J. RILEY, PRESIDENT
EAST CHICAGO, INDIANA

The best-maintained railroads in the United States and Canada use JORDAN SPREADERS with Attachments . . . The Jordan spreads earth and bulky materials, moves snow, forms ditches, slopes banks, fights ice.

WHARTON

Trackwork

IS known the world over—for since the beginning of the railroad industry this company has been inseparably associated in the design and application of better trackwork.

The severest pounding of modern power only serves to demonstrate the greater endurance of Wharton equipment.

We are prepared to furnish designs suited to individual standards of railroads or special designs as requested.

Switches—Frogs—Crossings—of TISCO Manganese Steel

Wm. Wharton Jr. & Co., Inc.
Easton, Pa.

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WE HAVE PURCHASED FROM THE EARLE GEAR & MACHINE COMPANY, OF PHILADELPHIA, PENNA.

THEIR ENTIRE LINE OF

CENTRIFUGAL PUMPS

THIS ADDITION TO OUR LINE OF

RECIPROCATING POWER PUMPS

ENABLES US TO THOROUGHLY SERVICE YOUR PRESENT AND FUTURE PUMP INQUIRIES

THE ALDRICH PUMP COMPANY
ALLENTOWN, PA.

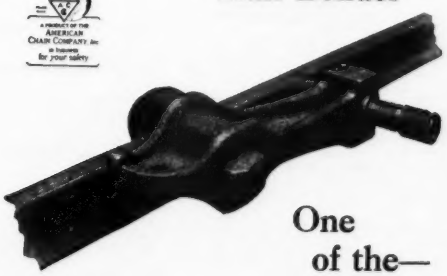
Trackmen prefer this READING Reversible Rail Bender

It saves time as it can be used either left or right hand simply by reversing the hook. Extra length of rail or angle bars are unnecessary.

All Reading Specialties for Railroads are made to the highest standards of materials and workmanship. "There can be no compromise with *safety*." Many have exclusive features that result in great economy.

Write for the Reading Specialty Catalog—a copy should be in your hands for ready reference.

A "2 in 1" Rail Bender



One of the—

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"ACCO" One-piece Guard Rails, "ACCO" Drop-Forged and "RESCO" Cast Steel Guard Rail Clamps, "SAMSON" Rail Benders, "READING" Reversible Rail Benders, Compromise Joints, Car and Engine Replacers.

AMERICAN CHAIN COMPANY, INC.

Reading Specialties Division

Bridgeport, Connecticut

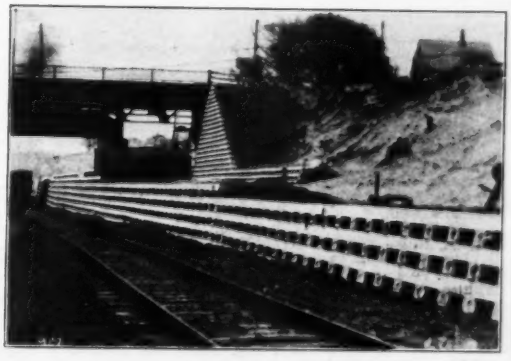
District Sales Offices: Boston Chicago New York Philadelphia Pittsburgh Portland San Francisco

The Wabash Railway and Illinois Central recently placed two more large orders for 90,000 lineal feet of our

"Automatic-Interlocking-Flexible"

Precast Concrete Cribbing

You too can cut the cost of your Retaining Wall requirements 50% by specifying SALVAGEABLE "Automatic-Interlocking-Flexible" Concrete Cribbing. Write for our latest catalogue supplement.



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The Pennsylvania System—Six Separate Installations.
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THE R. C. PRODUCTS COMPANY, Inc.

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Dixon Crucible Co., Jos.

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Pipe, Corrugated.
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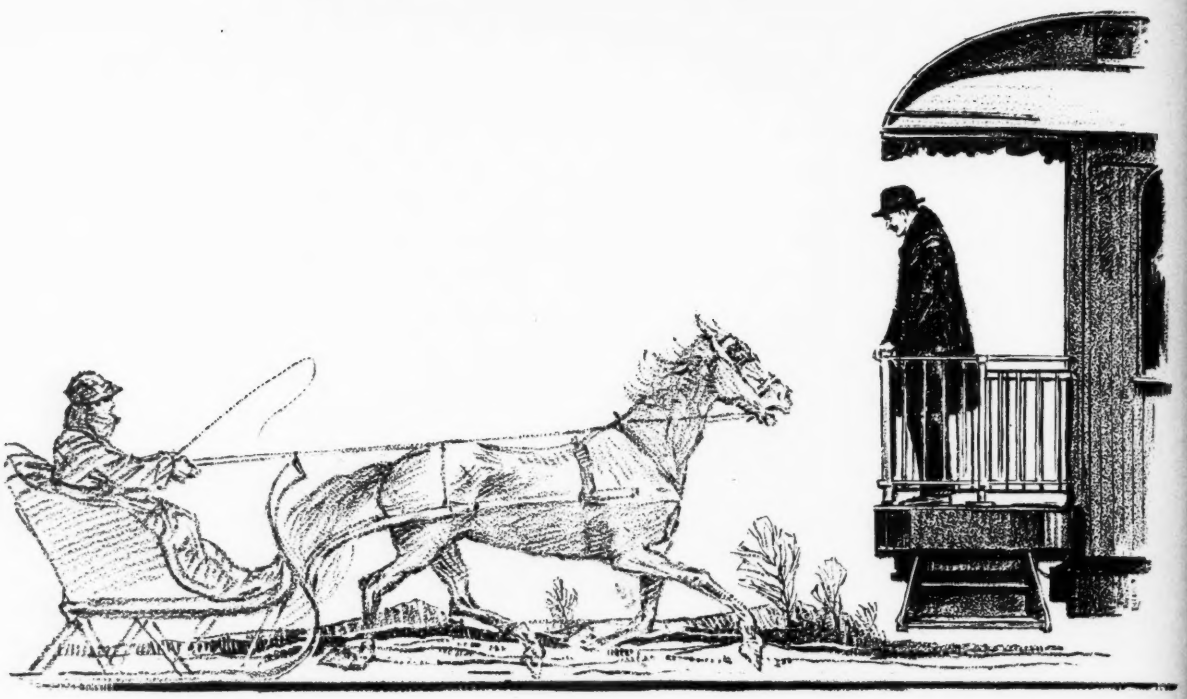
General Offices—Galveston, Texas

Plants: Texarkana, Texas Beaumont, Texas Galveston, Texas



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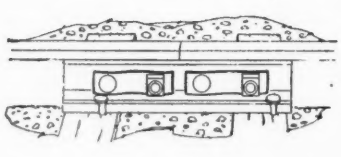
Second—you will note that there are no "sleighbells." The familiar tinkling sound that warns you of loose bolts cannot be heard because there are no loose bolts.



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See the two advertisements in the insert in this issue.